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A COMPARISON OF STUDENTS IN SINGLE-SEX CLASSES AND COEDUCATIONAL CLASSES IN HIGH POVERTY PUBLIC ELEMENTARY SCHOOLS IN MATHEMATICS AND READING ACHIEVEMENT

A Dissertation

Presented for the

Doctor of Education Degree

The University of Tennessee at Chattanooga

Ashley Elizabeth Aldridge

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DEDICATION

This dissertation is dedicated to my late parents, Colin and Alexis Aldridge, who bathed me lavishly with love, laughter, and the joy of family. God blessed me with parents who fostered a belief that with hard work and dedication I could accomplish any dream. I miss my parents more than words can express, especially on days like today when I am flooded with JOY!

This dissertation is also dedicated to two dear families who have made a tremendous impact on my life. The Lord graciously blessed me with "stand in" parents, Barbara and Craig Clayton and Betsy and Doug Goodfellow, who opened their hearts, homes, and families to me after my parents passed. I am thankful for the way you have covered me in prayer over the years as you have watched me follow every dream, some of which required more prayer than others! Thank you for always believing in me. I am especially grateful for your Godly advice and wise counsel. Our families have shared so many wonderful memories. The most beautiful gift I have ever been given is the way you have loved me as if I was your own daughter. Thank you for sharing my joy today. I love you!

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Abstract

The purpose of this study was to investigate whether any statistically significant differences in mathematics and reading academic achievement and academic gains of male and female students taught in single-sex classes existed when compared to male and female students taught in coeducational classes. This study reported findings from mathematics and reading achievement scores and academic gain scores from 850 fourth and fifth grade participants enrolled in seven high poverty public elementary schools during the 2007-2008 school term. The experimental group consisted of 347 students taught in single-sex classes. The control group contained 503 students who were taught in coeducational classrooms within the same schools. Four distinct groups were analyzed within the study: female students taught in single-sex classes, male students taught in single-sex classes, female students taught in coeducational classes and male students taught in coeducational classes.

Students were examined in three ways: as fourth and fifth grade students combined, only fourth grade students and only fifth grade students. The findings varied in results. Female students taught in coeducational classes attained higher means in reading achievement levels compared to all other class types. Males taught in single-sex classes showed significantly higher growth in reading and mathematics than all other class types. In some instances there were no differences noted in reading or mathematics achievement scores or academic growth between the groups. While the results of this study have implications for all professionals who work with public school students, special attention has been given to implications for school leaders in high poverty schools where gender achievement gaps are prevalent.

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CHAPTER I

OVERVIEW OF THE STUDY

Introduction

According to the U.S. Department of Education, for the majority of the country's history, coeducation has been the typical structure for public schooling. Interest in public single-sex education has been growing in favor since the Elementary and Secondary Education Act (ESEA) was amended by the No Child Left Behind Act of 2001 (NCLB) which allowed school districts to offer single-sex schools and classrooms using local or innovative program funds to meet achievement gaps (Riordan, 2002). In October 2006, the United States Department of Education published amendments to Title IX (Title IX of the Education Amendments of 1972 (20), U.S.C. § 1681), which gave public school districts greater authority to implement single-sex classrooms (U.S. Department of Education, 2008).

Hamilton County Department of Education, a public school district in Chattanooga, Tennessee, had a total of 347 fourth and fifth grade students in 2007-2008 who were instructed in single-sex classes in seven Title I elementary schools. Students in these single-sex class configurations were taught alongside traditional fourth and fifth coeducational classrooms consisting of 503 students in the same school buildings. This type of school, which houses single-sex classes as well as coeducational classes, is called a dual academy. This study examined the impact of single-sex classes on academic achievement and academic gains in mathematics and reading in Title I dual academy elementary schools in Hamilton County, Tennessee.

Statement of the Problem

High poverty schools around the United States face enormous challenges with low performing student achievement that lags far behind that of their counterparts from higher socio-economic populations (Kozol, 1992). School systems are looking for innovative initiatives that will close the gender achievement gap of students from backgrounds of poverty. Cornelius Riordan (1999) in his article, *The Silent Gender Gap*, discussed the achievement gap between male and female students. Riordan (1999) contended that males are increasingly on the unfavorable side of the gender achievement gap in coeducation.

In the United States, due to economic necessity, coeducation has been the norm for public education throughout most of the country's history (Salomone, 2003). The passage of revisions to Title IX with No Child Left Behind Act (2006) allowed public schools the option of utilizing single-sex classes for instruction. Despite the significant historical framework of coeducational schools, questions remain about the hypothesized relationship between single-sex schooling and academic performance (Riordan, 2002). Leonard Sax (2006), founder of the National Association of Single-Sex Public Education (NASSPE), is the leading supporter for single-sex public schooling. Sax (2006) contends that to adequately instruct students, teachers must teach towards learning differences of males and females, and this is best accomplished in single-sex learning environments. Moreover, Michael Gurian (2009) has also contributed immensely to the research regarding brain-based learning for the sexes.

The development of single-sex classes in public schools is an initiative that has attempted to utilize the key factor of arranging students by sex for instruction as the catalyst for improving academic achievement and growth at a greater rate than students in coeducational instructional settings. Spielhagan (2008) contends that single-sex classes seem to be most effective when related to the developmental needs of the students. Moreover, Speilhagan (2008) retorts that simply grouping students by sex for instruction will not automatically result in higher achievement.

Opposing single-sex classes in public schools are David Sadker and the American Civil Liberties Union. They hold fast to belief that coeducation is the best instructional design. If a coeducational setting is not meeting the needs of either sex, they recognize that reform to the existing educational model is needed. They also consistently uphold the argument that single-sex education is not the answer to addressing the gender achievement gap that exists between the academic performance of male and female students (Bracey, 2006).

The relationship of single-sex class structure in public schools and academic achievement across the United States has garnered new attention since the passage of revisions to Title IX with No Child Left Behind Act (2006) which allowed public school districts the opportunity to try innovative approaches, such as single-sex schooling, to address the achievement gap of students in high poverty schools. Countering opinions on the effectiveness of single-sex schooling support the fact that additional research is needed to evaluate single-sex educational models.

Significance of the Study

Schools serving high poverty students around the country are seeking ways to close the gender gap and address the disparity between the academic performance of male and female students. In addition, high poverty public schools, more often than not, have an enormous challenge to significantly increase student achievement and academic gains (Kozol, 2005). Furthermore, the Hamilton County Department of Education has invested a considerable amount of resources in the development of single-sex classes. It was crucial to determine if the implementation of single-sex classroom structure for instruction made a positive impact on mathematics and reading academic achievement and academic gains.

Purpose of the Study

The purpose of this study was to investigate if there are any statistically significant differences in mathematics and reading academic achievement and academic gains of male and female students in single-sex classes compared to male and female students in coeducational classes in fourth and fifth grade within the same set of high poverty public elementary schools. This study provided decisive information for leaders of high-poverty schools to help determine if grouping students by sex for instruction can positively affect academic achievement and academic gains in the areas of mathematics and reading.

Research Questions

1. Was there a statistically significant difference in mathematics Tennessee Comprehensive Assessment Program Normal Curve Equivalent (TCAP NCE) achievement scores of fourth and fifth grade male and female students in single-sex classes compared to male and female students in coeducational classes respectively within the same set of schools?
2. Was there a statistically significant difference in mathematics TCAP NCE achievement scores of fourth grade male and female students in single-sex classes compared to male and female students in coeducational classes respectively within the same set of schools?
3. Was there a statistically significant difference in mathematics TCAP NCE achievement scores of fifth grade male and female students in single-sex classes compared to male and female students in coeducational classes respectively within the same set of schools?
4. Was there a statistically significant difference in mathematics Hamilton County Value-Added Score (HCVAS) gains of male and female fourth and fifth grade students in single-sex classes compared to the academic gains of male and female fourth grade students in coeducation classes respectively within the same set of schools?
5. Was there a statistically significant difference in mathematics HCVAS gains of male and female fourth grade students in single-sex classes compared to the academic gains of male and female fourth grade students in coeducation classes respectively within the same set of schools?

6. Was there a statistically significant difference in mathematics HCVAS gains of male and female fifth grade students in single-sex classes compared to the academic gains of male and female fourth grade students in coeducation classes respectively within the same set of schools?
7. Was there a statistically significant difference in reading TCAP NCE achievement of fourth and fifth grade male and female students in single-sex classes compared to the academic gains of fourth grade male and female students in coeducation classes respectively within the same set of schools?
8. Was there a statistically significant difference in reading TCAP NCE achievement of fourth grade male and female students in single-sex classes compared to the academic gains of fourth grade male and female students in coeducation classes respectively within the same set of schools?
9. Was there a statistically significant difference in reading TCAP NCE achievement of fifth grade male and female students in single-sex classes compared to the academic gains of fourth grade male and female students in coeducation classes respectively within the same set of schools?
10. Was there a statistically significant difference in reading HCVAS of fourth and fifth grade male and female students in single-sex classes compared to the academic gains of fourth grade male and female students in coeducation classes respectively within the same set of schools?
11. Was there a statistically significant difference in reading HCVAS of fourth grade male and female students in single-sex classes compared to the academic gains of

fourth grade male and female students in coeducation classes respectively within the same set of schools?

12. Was there a statistically significant difference in reading HCVAS of fifth grade male and female students in single-sex classes compared to the academic gains of fourth grade male and female students in coeducation classes respectively within the same set of schools?

Overview of Methodology

This study involved a quasi-experimental comparative approach to explore the extant data available, and thus involved no pretest or random assignment of subjects. Mathematics and reading achievement data from the Tennessee Comprehensive Assessment Program (TCAP) were analyzed to determine if these data differed between single-sex and coeducational classes for seven Title I dual academy schools. From the above-mentioned data, the Office of Testing and Accountability, Hamilton County School, computed a value-added measure based on NCE variables believed to be predictors of academic gains. These scores are known as Hamilton County Value-Added Scores (HCVAS). As with TCAP scores, HCVAS for mathematics and reading were analyzed to determine if these gain scores differed between single-sex and coeducational classes in these seven dual academy schools. These same procedures were employed also to look only at fourth and fifth grade students separately in mathematics and reading TCAP NCE achievement scores and HCVAS gain scores. Written summaries representing the population sample and control group, as well as summaries describing any patterns noted, were provided.

Population and Sample

The target population for this study was 850 fourth and fifth grade students in seven Title I dual academy elementary schools in Chattanooga, Tennessee. The experimental group, illustrated in Figure 1.1, consisted of 347 students taught in single-sex classrooms during the 2008 school year. The balance of students, presented in Figure 1.2, represented the control group of 503 students who were taught in coeducational classrooms within six of the same seven schools. Although the school labeled 7 was a dual academy school containing coeducational classes in grades pre-kindergarten through third grade, fourth and fifth grades had only single-sex class configurations. Four distinct class types of fourth and fifth grade students were identified for the study: female students taught in single-sex classes, male students taught in single-sex classes, female students taught in coeducational classes and male students taught in coeducational classes. The seven schools included in this study were all classified as high poverty schools according to Title I Federal Guidelines. Figure 1.1 and Figure 1.2 include the range in poverty levels from 61.75 percent to 96.95 percent. Also included in Figure 1.1 were the 347 students participating in the experimental group of students who were taught in single-sex classes by school. Figure 1.2 represents the 503 students in the control group which were taught in coeducational classes by school.

Figure 1.1
Experimental Group of 18 Single-Sex Classes

School	Sex of Teacher	Grade	Class Configuration	Free or Reduced Lunch
1	Female	5th	Male	61.75%
1	Female	5th	Female	61.75%
2	Female	5th	Male	71.88%
3	Female	5th	Female	64.26%
3	Female	5th	Male	64.26%
4	Male	5th	Male	86.05%
4	Female	5th	Female	86.05%
5	Female	5th	Female	77.14%
5	Male	5th	Male	77.14%
6	Female	4th	Male	96.00%
7	Female	4th	Female	96.95%
7	Female	4th	Female	96.95%
7	Male	4th	Male	96.95%
7	Female	4th	Male	96.95%
7	Female	5th	Female	96.95%
7	Female	5th	Male	96.95%
7	Female	5th	Male	96.95%
7	Female	5th	Female	96.95%

Figure 1.2
Control Group of 22 Coeducational Classes

School	Sex of Teacher	Grade	Class Configuration	Free or Reduced Lunch
1	Female	4th	Coeducational	61.75%
1	Female	4th	Coeducational	61.75%
1	Female	4th	Coeducational	61.75%
1	Female	5th	Coeducational	61.75%
2	Female	4th	Coeducational	71.88%
2	Female	4th	Coeducational	71.88%
2	Female	4th	Coeducational	71.88%
2	Female	5th	Coeducational	71.88%
3	Female	4th	Coeducational	64.26%
3	Female	4th	Coeducational	64.26%
3	Female	5th	Coeducational	64.26%
4	Female	4th	Coeducational	86.05%
4	Female	4th	Coeducational	86.05%
4	Female	5th	Coeducational	86.05%
5	Female	4th	Coeducational	77.14%
5	Female	4th	Coeducational	77.14%
5	Female	5th	Coeducational	77.14%
6	Female	4th	Coeducational	96.00%
6	Female	4th	Coeducational	96.00%
6	Female	5th	Coeducational	96.00%
6	Female	5th	Coeducational	96.00%
6	Female	5th	Coeducational	96.00%

Definitions of Terms

The following terms and definitions are included for the purpose of clarification of unfamiliar terms or explanation of specific vocabulary used within the study:

Academic Gains - the amount of improvement when comparing two or more years of academic performance; for purposes of this study, HCVAS academic gains are calculated using student performance data from TCAP. A growth score was calculated using data from years 2007 to 2008.

Academic Performance - a student's educational movement towards meeting academic standards set forth by state government

Achievement Gap - a discrepancy in academic achievement in a particular subject after data are disaggregated by race, sex, or socioeconomic status

Coeducational – an educational setting comprised of male and female students who are instructed together

Constantly Enrolled - students who were in enrolled in one school participating in this study from August 2007 before the twentieth day of school and remained enrolled in the same school until TCAP testing was completed in April 2008

Dame School - also known as the para-school, was a grass roots educational movement in the American colonies where older literate women of the community held informal primary school in their homes, often in the kitchen

Dual Academy - a school facility where some male and female students are taught together in a coeducational setting and others are taught in a single-sex setting

Equal Protection Clause - part of the Fourteenth Amendment to the United States Constitution that provides that "no state shall ... deny to any person within its jurisdiction the equal protection of the laws" (CB, Vol. 4, p. 531).

Feminine - characteristics of behaviors associated with female gender qualities

Free and Reduced Lunch - a free or reduced priced lunch program in a school setting based on limited total family income that meets criteria qualifying a family for food stamps or identifying the family as meeting federal poverty guidelines

Geographically Accessible Location - a school within a district that is accessible by bus transportation paid for by the district

Gender - socially constructed roles, behaviors, activities and characteristics that a given society considers suitable for men and women. Masculine and feminine are gender characteristics

Gender Gap - a discrepancy noted in achievement between the academic performance of males and the academic performance of females

Grade Equivalent - estimated grade level performance corresponding to a given score

Hamilton County Value-Added Score using Normal Curve Equivalent (HCVAS) - an internal calculation by The Office of Testing and Accountability, Hamilton County Schools, Tennessee, that determines an individual student's rate of improvement based on NCE scores in a subject area. (See Appendices C and D for additional explanation.)

High Poverty Schools - schools in which at least sixty-five percent of the school's student population receives free or reduced lunch

Highly Qualified - qualification of a K-12 public school educator who, under the Federal No Child Left Behind Act of 2001, has full state teacher licensure certification in a particular teaching content area and holds a valid teaching license. This does not include educators who have received a teaching waiver on a temporary or emergency basis

Learning Styles - the active, passive, reflective or impulsive avenues of visual, kinesthetic, auditory, verbal or any combination of these by which a person best understands and retains learning

Masculine - characteristics of behaviors associated with male gender qualities

National Association for Single Sex Public Education (NASSPE) - an association established in the United States for the advancement of single-sex public education

Norm - a performance standard developed by a reference group. Typically norms are developed by assessing a model group and then computing standard scores for the group's test achievement

Normal Curve Equivalent (NCE) - a test score that is reported on a scale that ranges from 1 to 99 with an average of 50. NCE scores are somewhat equal to percentiles with an assumption that if plotted within a normally distributed population, the result will be a bell shape curve.

Private School - an independent school that has the right to freely select students and is funded privately through endowment and/or tuition that is not governed by local, state or national agencies

Public School - a tuition-free school that is funded by tax revenue and governed by local, state, or national agencies

Schools Administrative Student Information (SASI) - a computer-based pupil data system created by Pearson School Systems that gives educational administrators access to student data including demographics, attendance, schedules, student discipline, grades, assessment histories, and state reporting codes

School Day - in Tennessee, it is defined as 7.5 hours in duration, one of the one hundred-eighty days during which a school is in session

School Law - legally enforceable laws, regulations, and codes related to education

Self Esteem Through Culture Leads to Academic Success (SETCLAE) - a model curriculum created by Jawanza Kunjufu that provides a mechanism through which educators, youth workers, and parents can teach their children positive aspects of their cultural heritage and simultaneously increase their self-esteem and their desire to excel.

Sex - the biological and physiological distinctive traits that define men and women; the terms male and female are sex characteristics

Single-Gender Class - a class designated for and serving exclusively male students or female students and reinforcing traditional gender roles

Single-Sex Class - a class designated for and serving exclusively male students or female students

State Standard - K-12 academic achievement performance indicators for each subject area established by each state for use by educators in planning instruction

Standardized Test - a test that has been normed against a specific population and which is administered and scored consistently

Student Attendance - the record of frequency in which a student is present at school

Tennessee Comprehensive Assessment Program (TCAP) - a timed, multiple choice, standardized achievement test administered to public school students in the state of Tennessee in grades 3-8. This assessment measures skills in mathematics, reading, language arts, science, and social studies

Title I - a component of The Elementary and Secondary Education Act of 1965 (ESEA) that provides financial assistance for the education of students in schools with more than 40% of the population consisting of students from backgrounds of poverty

Title IX - a United States Educational Amendment enacted on June 23, 1972 that states: "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance" (Title IX of the Education Amendments of 1972 (20), U.S.C. § 1681).

Transient Rate – For the purposes of this study this term refers to the length of time a student is in one school or school system before transferring to another school.

Value-Added - For the purposes of this study, the term value-added refers to the calculation developed and used by The Hamilton County Department of Education Office of Testing and Accountability. See HCVAS definition.

Delimitations

All teachers in this study were Highly Qualified as measured by NCLB standards. TCAP is a nationally standardized test used in all Hamilton County schools. NCE scores are reported for all schools. Students in high-poverty schools have a high transiency rate; therefore, only students who were constantly enrolled from August 2007 to April 2008 in one of the seven schools were included in this study. If a student transferred to a participating school after the first 20 days of school, the student's scores were not included in this study.

Limitations

Data analyzed in this study were limited to the 2008 academic year. Student achievement data were collected from students in seven Title I, federally assisted, dual academy schools in Hamilton County, Tennessee. Students in this study were taught by different teachers; therefore, equal instructional quality is a factor that was considered a limitation. In addition, teachers in each school have participated in varied professional development and training. Moreover, the student bodies for each school were comprised of students from different neighborhoods; therefore, it was important to recognize the uniqueness of each school. The seven schools in this study had unique school cultures. Due to the ex post facto nature of this study and analysis of extant data, some

experimental class type groupings were smaller than comparative control groups. The results of this research study are not necessarily transferable to other schools settings without very similar demographics and school variables.

Methodological Assumptions

Several basic assumptions underpinned the methodology of this research. The initial assumption was the comprehensive identification of the experimental and control groups. It was assumed that all single-sex fourth and fifth grade classes were identified for 2007-2008 in Title I schools in Hamilton County. Moreover, it was understood that within the seven schools participating in this study, all co-educational fourth and fifth grade students were identified respectively.

An additional assumption was that that TCAP NCE and HCVAS accurately measured and reported factors for analysis. Also, it was assumed that the subject areas assessed on the TCAP provided an adequate set of measurable indicators to analyze levels of academic achievement for all groups.

Another methodological assumption was that all data points were calculated correctly and entered accurately into appropriate databases. For example, it was assumed that TCAP data were entered into the HCDE data base correctly. Additionally, it was assumed that attendance records were entered into the HCDE SASI data base correctly in order to insure that only students who maintained constant enrollment from August 2007 to April 2008 in one of the seven schools were identified and included in the study. Another assumption was that HCVAS gain scores for each student were formulated correctly by an internal calculation of the Office of Testing and Accountability of

Hamilton County Schools. Moreover, all data points for students and schools were assigned a confidential data code in order to maintain anonymity of subjects.

Each teacher in this study was determined to be highly qualified by the Tennessee Department of Educational Licensure. All teachers in this study were assumed to be equally qualified to deliver effective instruction for all students.

There were further assumptions regarding the reasons principals restructured fourth and fifth grade students into single-sex classes. Conversations with school-level administrators indicated that several factors led to the reorganization of students and their placement in single-sex settings. The basis for selection of students to be included in single-sex classrooms varied from school to school. In the seven schools involved in this study, school administrators had recognized that a gender gap in achievement was apparent. Males were lagging behind females, particularly in the area of literacy/reading. Also, behavioral issues were of significant concern, thus it was assumed the reorganization of classes into single-sex groupings was an attempt to capture additional instructional time which had formerly been lost when students were enrolled in coeducational classes. Finally, the level of professional development related to single-sex instruction which was afforded to teachers involved in this project varied dramatically between schools.

Summary and Dissertation Outline

Chapter I provides a succinct introduction into the background of the problem regarding the need for high poverty public schools to determine if the strategy of implementing single-sex classrooms could potentially make a significant difference in positively addressing the gender achievement gap in mathematics and reading. Chapter II

contains a review of the literature related to the historical context of single-sex classes, perspectives including criticism on single-sex education, learning differences between male and female students, and an overview of challenges facing minorities and students from backgrounds of poverty. In Chapter III the methodology for the quasi-experimental comparative study is thoroughly outlined. Chapter IV presents quantitative analysis of the findings and results of the study. In Chapter V, the central aspects and findings of the dissertation are summarized and recommendations are discussed.

CHAPTER II

REVIEW OF THE LITERATURE

Historical Context of Single-Sex Education

Education in America can be traced back to the first European settlers who, within "a decade or two after landing in the American wilderness, had established town schools, a Latin grammar school and even a college, Harvard" (Kolesnik, 1969, p.68). Education for males allowed for the interpretation of scripture, which was a core value of the Protestant revolt (Riordan, 1990).

Females, on the other hand, did not receive a formal education. Traditionally, men were educated so they would have the ability to read scripture for the family. In early American culture, there was no justification for women to be educated. Puritans viewed the female's human nature as inherently weak or evil (Riordan, 1990).

As the colonies expanded, the need for education to be governed was recognized. "In 1647, the Massachusetts Bay Colony passed the 'Old Deluder Satan Act' requiring every town of 50 families or more to support a schoolmaster" (Kolesnik, 1969, p.69). Other colonies prioritized education as well. "In 1692, Virginia and Massachusetts enacted a law requiring heads of households to assume responsibility for the education of their families" (Riordan, 1990, p. 25).

A significant milestone for colonial education was the development of institutions for higher learning. These universities were only for male students and were primarily founded to produce educated clergy in the American colonies. The first universities in the American colonies were Harvard (1636), William and Mary (1693), Yale (1701),

Princeton (1746), Columbia (1754), Pennsylvania (1755), Brown (1764), Rutgers (1766) and Dartmouth (1769) (Riordan, 1990).

As the American colonies expanded, women in townships and those who lived in the cities were heavily involved in family businesses, and new skills for trade and commerce became a necessity. Economic demands in growing colonies proved the need for women to be literate. Creation of the dame school, also known as the para-school, was a grass roots educational movement in the American colonies; older informally educated literate women of the community held primary school in their homes, often in kitchens. Both boys and girls received literacy skills as women continued with domestic responsibilities. The primary purpose of the dame school was to prepare boys to enter town-subsidized schools. Girls benefited by becoming literate as well as learning skills necessary for the marketplace. This was the first time in colonial American history that boys and girls were instructed together. More importantly, this is the first evidence in American history that women were teachers (Riordan, 1990).

Due to attitudes and conservative views toward educating women, in some towns females would only be allowed to attend town schools at times when boys were not present. Attendance by females would be permitted “early in the morning, late in the afternoon, during certain days of the week or certain months of the year, usually the summer months” (Kolesnik, 1969, p.85). “Not until 1789 were girls admitted to Boston public schools” (Draper, 1909, p. 262). The Quakers were at the forefront of launching coeducational schools in the late 1700s. After first starting summer programs which admitted girls, several Quaker schools later developed full-year co-educational programs (Riordan, 1990).

At the close of the eighteenth century, dame schools, town-subsidized schools and religious schools were the fundamental paths for educating the general public (Riordan, 1990).

> The majority of male students attended dame schools for elementary instruction and then continued their education in town schools. More advanced male students continued on in academies or grammar schools and possibly colleges. Female students also attended dame schools, and a small percentage went on to town schools. Some females attended emerging female academies, but women were not allowed in colleges. Education beyond the informal dame school and sex-segregated town schools was single-sex and private, tailored for the children of wealthy upper- or middle-class families (Riordan, 1990, p. 27).

Thomas Jefferson was the first to propose the idea of a free, compulsory education in 1779. Jefferson first recommended three years of public education for males and females in Virginia. It was not until many years later, during his presidency, that his initiative took root. “Between 1825 and 1860, the proposal to provide free primary education to all children, male and female, was hotly debated” (Riordan, 1990, p.85). Kolesnik (1969) noted that this issue was second in importance only to the issue of slavery. Before the end of the nineteenth century, the idea of a tax-supported free education was mostly an institutionalized practice (Riordan, 1990).

The common-school was the first type of tax-supported school. Most common schools were one-room school houses where boys and girls were instructed together. The school served children from middle-class households and the curriculum was basic:

reading, writing and arithmetic. Although this mixed-sex education was the forerunner for coeducation, children were separated. Boys and girls sat on opposite sides of the room for instruction. Children of the opposite sex were not allowed to play together for recreation or socialization. Coeducation of this type was tolerated out of economic necessity (Riordan, 1990). “Respondents to a Bureau of Education (1883) questionnaire often cited economic necessity for the institution of mixed-sex education. Most towns could not afford two schools, so it developed that the sexes were educated together” (Riordan, 1990, p. 29). Although society preferred single-sex schooling and separate schools for males or females, as states began to fund public schools, it was widely accepted for schools to move towards coeducation (Riordan, 1990).

In 1827, the state of Massachusetts required any town consisting of 500 or more households to establish a high school (Riordan, 1990). “The first public girls’ high school opened in 1824 in Worchester, Massachusetts, and the first coeducational high school originated in Lowell, Massachusetts, in 1840” (Kolesnik, 1969, p.87). After the Civil War, the American high school movement grew at an impressive rate. “In 1880 there were nearly 800 high schools; by 1890, over 2500; and by the end of the century, more than 6000, the great majority of which were coeducational” (Kolesnik, 1969, p.88).

By the beginning of the twentieth century, public education in America was expanding and was almost entirely mixed-sex in structure (Riordan, 1990). The U.S. Commissioner of Education in 1901 reported that “in 1900, 98 percent of public high schools in America were coeducational” (Riordan, 1990, p.14). After examining hundreds of pictures of 20th century classrooms in the photographic division of the Library of Congress, Hansot and Tyack (1998) reported that photographs typically

depicted a general mixing of the sexes in academic classrooms" for most public high school students (p. 40). "By 1924, about 90 percent of high schools in America were under public control, reversing a statistic favoring private schools just a century earlier" (Cole, 1928).

The educational development in our country has changed over time. Males were educated in the American colonies, and females were excluded from educational opportunities until society determined the need for women to be literate. Dame schools, town-subsidized schools and common schools provided educational opportunities in small communities and growing towns. Separate schools followed for each sex. In time coeducation was necessitated by economic efficiency. As education expanded in the public arena, coeducation became the norm for public schooling in the United States (Riordan, 1990).

Legal Context of Single-Sex Education

There is a considerable amount of research on school litigation regarding single-sex schooling. In an attempt to understand gender equity in education, Salomone (2003) scrutinized the hallmark events of 1954, 1972 and 1996 in her book, *Same, Different, Equal: Rethinking Single-Sex Schooling*.

In 1954, the Supreme Court issued a unanimous decision which would impact racial segregation for years to come. Brown vs. Board of Education, (347) U.S. 483 (1954), became foundational in breaking down social and political obstacles that had historically barred particular groups, including minorities and women, from equal opportunities (Salomone, 2003).

> *Brown v. Board of Education* (1954) was not simply about children and education. The laws and policies struck down by this court decision were products of the human tendencies to prejudge, discriminate against, and stereotype other people by their ethnic, religious, physical, or cultural characteristics. Ending this behavior as a legal practice caused far reaching social and ideological implications, which continue to be felt throughout our country. The *Brown* decision inspired and galvanized human rights struggles across the country and around the world (Brown Foundation for Educational Equity, Excellence and Research, 2004).

Another important decision related to discrimination in education was Title IX (Title IX of the Education Amendments of 1972 (20), U.S.C. § 1681). Title IX stated "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance". Title IX has been noted for its impact on high school and collegiate athletics, but interestingly, in the original statute, there was no reference to athletics (Retrieved May 28, 2009, from http://en.wikipedia.org/wiki/Title_IX).

Title IX of the Education Amendments of 1972 and the Equal Education Act of 1974, together with the Fourteenth Amendment Equal Protection Clause, “became the primary vehicles for advancing equality for women in the educational arena” (Salomone, 2003, p.116). “The passage of Title IX of the Educational Amendments of 1972 virtually mandated that American public education be coeducational and climaxed the institutionalization of coeducation in American society” (Riordan, 1990, p.3).

Another historical legal case involving educational equity was The United States vs. Virginia, (1996), 518 U.S. 515. In this case, The Supreme Court decided the Virginia Military Institute (V.M.I) was violating the Equal-Protection Act of the 14th Amendment in the case of The United States vs. Virginia, (1996), 518 U.S. 515. The State of Virginia proposed opening an all-female military academy instead of allowing women to be admitted to VMI. The Supreme Court ruled that this was not a viable remedy, because VMI provided opportunities for making "powerful connections within Virginia's military and political elite" (Weil, 2008, p.10) that would not necessarily be offered at an all-female military institution.

The National Association for Single-Sex Public Education (NASSPE), on October 25, 2006, announced new regulations governing single-sex education in public schools (Retrieved February 23, 2009, from http://www.singlesexschools.org/home.php). According to provisions in the No Child Left Behind (NCLB) legislation, coeducational elementary and secondary schools may offer single-sex classrooms if they meet three criteria prior to implementing the program. Nancy Steinbach (2004) overviewed the three criteria which allow public schools to have single-sex classes. First, there must be a good reason established for offering the class. "For example, if the school wants more girls to study computer science and few girls are doing so, the school could offer a computer science class for only girls. The second condition is that the school must offer a class in the same subject for both girls and boys" (Retrieved February 23, 2009, from http://www.unsv.com/voanews/specialenglish/scripts/2004/04/08/0041/). According to legislation, a coeducational class must be offered in the same subject at a geographically accessible location in the district (NASSPE, 2006).

Steinbach (2004) continued, “The third condition is that the school must examine the need for the single-sex class from time to time” ((Retrieved February 23, 2009, from http://www.unsv.com/voanews/specialenglish/scripts/2004/04/08/0041/). According to NASSPE, a review must be conducted every two years to determine whether single-sex class should be continued to meet the achievement gap (NASSPE, 2006).

In 1995, there were only two-single-sex public schools in the United States (Weil, 2008). Single-sex public education has become a growing structure for reform in the United States. “Nationwide 400 public schools in 37 states and the District of Columbia have at least one school with some single-gender classrooms, according to the latest count in November 2007 by the Poolesville, Maryland-based National Association for Single-Sex Public Education” (McNeil, 2008, p. 20). The number has been steadily increasing since the United States Department of Education (USDE) issued new regulations which permitted single-sex educational programs in schools that received federal funding (McNeil, 2008).

Arguments For and Against Single-Sex Education

Bracey (2007) reported that policy makers and educators continue to deliberate about the effectiveness of single-sex schools. The American Association of University Women (AAUW), Feminist Majority Foundation (FMF) and American University Professor David Sadker are in agreement that coeducation is the best instructional design. They maintain that if a coeducational setting is not meeting the needs of either sex, then reform is needed in the coeducational model. They uphold the argument that single-sex education is not the answer to addressing the gender gap that exists between the academic performance of male and female students (Bracey, 2006).

Riordan (1990) contends that because the majority of people in the United States were educated in a coeducational setting, they have little opinion or firsthand knowledge about single-sex education. According to him, coeducation reflects what is best about America because it mirrors life in a democratic society. In *Girls and Boys in School: Together or Separate,* Riordan (1990) contends that there is a consistent perception from people who attended single-sex schools, "coeducation signifies interpersonal freedom and healthier human relationships" (p. 1). Furthermore, ex-students and teachers of single-sex schools perceived that all students, especially male students, behaved better in coeducational environments than in single-sex schools (Riordan, 1990).

However, according to Woods & Dylinski (2002) the difference in effective classrooms was not the gender composition, but a commitment to "smaller class size, a rigorous curriculum, and high standards" (p. 4). These researchers also specifically argued the importance of parental involvement and effective classroom discipline. Moreover, they went on to explore the significant impact of good teachers and careful attention to eliminating gender bias (Woods & Dylinski, 2002).

Kim Gandy, President of The National Organization for Women (NOW), opposed the revised Title IX regulations allowing public schools to have single-sex classes (Gandy, 2006).

> Because school is the workplace for children, this kind of segregation is likely to increase sex stereotyping in adulthood by depriving both boys and girls of the opportunity to interact daily as peers during their formative years. Separating our daughters from our sons is an ineffective response to a complex problem, and it pulls resources away from dealing with a

broken public school system (Retrieved February 23, 2009, from http://www.now.org/press/10-06/10-24.html).

In a 2006 article published by the National Organization for Women, Gandy stated her belief that segregation was wrong in the past and continues to be wrong today. Furthermore, she expressed concern that the revisions to Title IX legislation made it permissible to advance one group and leave the other group behind (Gandy, 2006).

Representing a differing perspective, Sadker and Zittleman (2004) have been advocates for single-sex schools only in the private sector. Their research discovered factors leading to successful private single-sex schools, including lower class size, engaged parents, well-trained teachers and strong academic emphasis. Despite their past support for private single-sex schools, Sadker and Zittleman (2004) brought to the forefront concerns regarding mainstreaming single-sex classes in the public arena. Public schools have different factors from private schools and they feared that Title IX, an act of civil rights protection, might be violated. These authors maintained that historically, when groups are segregated, the least powerful group ends up with fewer resources and advantages. For example, female students, economically disadvantaged students, and minority students have historically had substantially fewer opportunities. For this reason, Sadker and Zittleman (2004) have expressed fear that offering single-sex public education under the revised Title IX might have a negative impact on students' civil rights. It is disconcerting to Sadker and Zittleman (2004) that some districts now have the ability to offer a single-sex option for boys and not for girls. They think that it is inequitable that schools may decide to purchase specific resources for a single-sex class and not for co-educational classes. Furthermore, they have insisted that providing an

advantage for one sex over the other contradicts the very essence of Title IX (Sadker & Zittleman, 2004).

Moreover, Salomone (2003) reported that "opponents of single-sex programs base their most foundational legal claim in the Equal Protection Clause of the Federal Constitution" (p.117). The argument against single-sex classrooms begins with a focus on separating boys and girls into single-sex classes. An unequal scenario may be created that could be perceived as unfair and unconstitutional. Richard Kahlenberg of the Century Foundation contends that policies that purposely separate students by race, gender, income or religion are in conflict with American education and the goal of bringing children of different backgrounds together (Thomas, 2008). In addition, opponents argue that single-sex schooling offers unequal treatment and therefore violates the rights of the group that is denied access to learn with the other sex (Salomone, 2003).

On the other hand, Bracey (2006) pointed out the fact that some people truly believe that coeducation is best, but under certain conditions of gender inequity, contend that single-sex classes and schools are viable alternatives for addressing the gender gap. This group has vocalized concerns regarding reports revealing unequal and disproportionate attention placed on male and female students in coeducational settings. In certain situations, single-sex classes might create more gender equity in the long run (Bracey, 2006). According to Michael Gerardi (2006), instructional practices in public schools favor female students over male students. "Co-educational classrooms tend to gravitate towards more feminine learning environments, if for no other reason than most teachers are female" (Retrieved February 23, 2009, from http://www.eagleforum.org/educate/ 2006/nov06/single-sex.html).

Kristi Kahl (1999), Coordinator of the Long Beach California Unified School District's middle school reform initiative expressed her sentiments regarding single-sex education to the Los Angeles Times. She described three factors that attribute to positive academic results: gender separation, instruction, and parent involvement (Sharpe, 2000).

In a study of at-risk, urban high school students, perceptions of single-sex instruction were solicited (Hoffman, et al, 2008). Teachers reported that, in their opinions, single-sex classroom environments were more conducive for learning than coeducational instructional settings. On the other hand, both male and female students denounced both the social and academic purported benefits of single-sex instruction (Hoffman, et al, 2008).

In 2005, the United States Department of Education collaborated with the American Institute for Research to publish a meta-analysis comparing single-sex and coeducational schools. After reading over two thousand citations, these agencies included 40 studies in their findings. Forty-one percent of the studies determined single-sex education to be effective, 45 percent found no positive or negative effects of either single-sex or coeducational schools and 8 percent favored coeducational schools (Weil, 2008). In a 2005 article, "The Promise and Peril of Single-Sex Public Education", Leonard Sax asserts that not all schools achieve favorable results when they restructure to develop single-sex classrooms. Hubbard and Datnow (2002) contend that many single-sex classes and schools are unsuccessful because stakeholders do not share a set of common beliefs regarding single-sex education. An unwavering resolve for why a school is offering single-sex education is critical in order for the program to be successful (Hubbard & Datnow, 2002). Furthermore, Leonard Sax, founder of the NASSPE and

leading advocate for public single-sex schooling, contends that professional development seems to be a critical component to single-sex classroom success. “At schools where single-sex classrooms were not effective, teachers received no specific training in best practices for gender-specific teaching. Putting a teacher in a single-sex classroom for which she is not suited by temperament or training may be a recipe for failure” (Sax, Retrieved February 23, 2009, from http://www.singlesexschools.org/edweek.html)

Providence University Professor Cornelius Riordan has spent a considerable amount of time researching the impact of single-sex education on at-risk students. He notes there are many variables that impact a successful school culture (Bracey, 2006). In the article “The Success of Single-Sex Education is Still Unproven” (2006), Riordan states his belief that single-sex schools are best for some demographic groups who are at-risk of underachievement. He maintains that single-sex schools are places where students can avoid the prevalent distractions that take place in most high poverty coeducational schools (Bracey, 2006).

According to Robert Kennedy’s article, “What Are The Advantages of Single Sex Education?”,

> The conventional thinking thirty years ago was that coeducation would break down gender stereotypes. That thinking turned out to be flawed. Boys in coeducational settings are less likely to take courses in the arts or tackle advanced academic subjects to avoid being typecast as a nerd. Similarly girls avoid the sciences and technology subjects because they don’t want to appear to be tomboys (Retrieved February 23, 2009, from http://privateschool.about.com/cs/choosingaschool/a/singlesex.htm).

Male and Female Students Learn Differently

Proponents of single-sex public education look to research to support their contention that male and female students learn in different ways according to brain chemistry. As a medical doctor and psychologist, Leonard Sax (2006) reports that elementary school age "girls' vision and thought processes have developed to respond better to color and detail, while boys' brains are more apt at processing motion and direction" (Retrieved February 23, 2009, from http://www.msnbc.msn.com/id/13229488/print/1/displaymode/1098/). Sax (2006) also contends that if educators do not see the fundamental differences in the way that male and female students learn and do not differentiate instructional practices, "the end result is a kindergarten classroom where boys tell you drawing is for girls and a middle school classroom where girls tell you computers are for boys" (Retrieved February 23, 2009 from http://www.msnbc.msn.com/id/13229488/print/1/displaymode/1098/). Moreover, Grace Chen (2009) reports that because the cognitive, behavior and social development of males and females is so different and unique, separating the genders allows for more accommodating instruction.

Gurian, Stevens, and Daniels (2009) have conducted research that emphasizes the importance of accommodating for male and female brain-based learning. In their book *Successful Single-sex Classrooms: A Practical Guide to Teaching Boys and Girls Separately*, these researchers emphasize specific strategies and activities that will support female and male learning styles in the classroom. Moreover, they contend that single-sex classrooms need to be structured to foster brain-based sex differences in learning (Gurian, et al. 2009).

According to research by The Principals' Partnership, sponsored by Union Pacific Foundation (2004), there are benefits for female students in single-sex classrooms. Girls express a greater interest in mathematics and science, spend more time studying and completing homework, focus more time on task in the classroom, and are overall more academically inclined. Dr. Karen Walker, University of Maine (2004) concludes that more female students are willing to openly discuss sensitive issues, experience fewer gender distractions and are less likely to possess stereotypical views of females in the workplace. Accepting leadership roles and developing skills needed in a competitive marketplace are also experiences afforded in a single-sex classroom. Furthermore, Dr. Walker found that female students in single-sex classes have more exposure to career choices in mathematics and science and therefore are more likely to study advanced levels of mathematics and science in university settings (Walker, 2004).

Steve Dylinski (2002), mathematics teacher at Philadelphia High School for Girls, argues that his students express that by attending an all female school they feel they avoid relationship drama, which is typically associated with coeducational schooling. Furthermore, his students report a bond has emerged where girls support and care about each other. Distractions of fashion and appearance are minimized. Among the girls there is a pervasive respect of different cultures and religions (Woods & Dylinski, 2002).

Preadolescent girls face an uphill battle when it comes to juggling puberty, developmental pressures and academic responsibilities in a coeducational learning environment. Research by Wollam (1990) revealed that both male and female teachers treat boys differently than girls in an academic setting (Hudson & Stiles, 1998). Sheperdson and Pizzini (1992) found that disruptions by male students were tolerated

more often than female disruptions. In addition, male students were called upon to answer more often and usually given opportunities for mechanical manipulation, whereas females were not (Sheperdson and Pizzini, 1992).

Michael Gurian (2009) reports "there are a number of ways specific schools do fail boys. Most teachers are not trained in how boys and girls learn differently… a lot of learning is not relevant, so boys check out" (Retrieved July 25, 2009 from www.usatoday.com/news/education/2009-04-08-gurian-boys_N.htm). The media's attention to the gender achievement gap, highlighting the disparities in academic performance of boys and girls, has drawn attention to the successful results of the Young Women's Leadership Academy (YWLA) in East Harlem. YWLA was created in 1996 by Ann Rubenstein Tisch to give inner-city girls an opportunity to learn in a single-sex environment. YMLA specifically aligns its instruction and learning activities to female preferred learning styles. This has resulted in the school consistently graduating 100 percent of its seniors. It has received national attention for its success (Cable & Spradlin, 2008).

Gurian, Stevens, and Daniels (2009) highlight proven benefits of single-sex education and reasons schools may choose to pursue the implementation of this instructional design. These researchers found that improved test scores, increased academic achievement, decreased disciplinary problems, more engaged learners, and strengthened teacher-student relationships are advantages of a single-sex educational program (Gurian, et al, 2009).

Walker (2004) identified benefits for males in single-sex public classrooms. Male students have a better possibility of graduating from high-school and a higher likelihood

of being on a college preparatory path. In addition, male students in single-sex classes were found to increase writing and reading skills and strategies for collaboration. Males also noted fewer gender distractions and expressed willingness to openly dialogue about more sensitive issues and concerns. Male students in single-sex classes reported having less stereotypical views of females (Walker, 2004).

Fletcher (2006) noted that teachers who create a classroom environment for males structure it with the following characteristics to engage boys in learning:

> …strong social component- the boys work together, side by side with lots of cross-talk; an active environment- an emphasis on doing rather than talking about it; an abiding sense of fun and play; student choice; and the presence of a strong mentor… who sets an example and establishes a structure with clear guidelines (Fletcher, 2006, p.149).

The issue of boys experiencing private versus public failure was revealed in a *Newsweek* cover article, "The Trouble with Boys", in which Peg Tyre (2006) brought to light the fact that boys look at every activity and interaction through a lens of whether or not it will make them appear weak. If the activity is going to reveal an inadequacy, more often than not, boys will avoid the activity (Tyre, 2006). Boys who enter the "engagement zone" exhibit a strong interest in the activity, have the will, stamina or stubbornness to keep trying, have unconstrained time to practice the skill, and have the space to fail privately (Fletcher, 2006).

In most coeducational classrooms, teachers unknowingly design classroom instruction to be advantageous to female students' learning styles over male students (Sax, 2008). Sax believes the best way to accommodate needs associated with male

preferred learning patterns is to teach boys and girls in separate classrooms designed intentionally to foster preferred earning styles (Sax, 2008). One study examining the gender gap in coeducational schools verses single-sex schools in New Zealand found that "in coeducational schools there was a statistically significant gap favoring females, while at single-sex schools there was a non-significant gap favoring males" (Gibb, et al, 2008, p. 301).

In his article "*The Boy Problem: Many Boys Think School is Stupid and Reading Stinks*", Saks (2007) explains that the gender gap is increasing between girls and boys, especially when we examine literacy. According to Sax (2007) "There has always been a gender gap in the propensity of kids to read for fun. Girls have always been more likely to read for pleasure than boys. But the gender gap has now grown so wide that it has become a marker of gender identity…girls read; boys don't" (Retrieved February 23, 2009, from http://www.schoollibraryjournal.com/index.asp). Saks has found that public schools which offer all-boy classes, where the format for learning is varied to accommodate for brain-sex differences, have a higher success rate in engaging male students in reading (Saks, 2007).

Minorities and Students from Backgrounds of Poverty

Riordan (1990) concluded that most Americans trust that coeducation provides educational equality to male and females. Because of this foundational belief, single-sex education is perceived as regressive and challenges the aforementioned premise of equality. Most conversations involving mixing or separating students for education primarily center around factors associated with race, socio-economic status, or ability grouping (Riordan, 1990).

Due to the long history of single-sex Catholic schools, there is a considerable amount of research which suggests that single-sex parochial schooling does not have a significant impact on the educational achievement of Caucasian middle- to upper-middle class boys. However, poor and minority students have shown measurably higher academic achievement in single-sex Catholic schools (Weil, 2008).

> According to Riordan, disadvantaged students at single-sex schools have higher scores on standardized math, reading, science, and civics tests than their counterparts in coed schools. There are two prevailing theories to explain this: one is that single-sex schools are indeed better at providing kids with a positive sense of themselves as students to compete with the anti-academic influences of youth culture; the other is that in order to end up in a single-sex classroom, you need to have a parent who has made what educators call 'a pro-academic choice'. You need a parent who at least cares enough to read the notices sent home and go through the process of making a choice- any choice (Weil, 2008, p. 12).

Many attempts have been made to improve the academic achievement of low-income and minority students through innovative initiatives such as Head Start preschool programs, comprehensive restructuring models such as Success for All and Accelerated Schools, after-school programs, and mentoring programs (Fashola, 2002). Irma Lerma Rangel Young Women's Leadership School (Y. W. L. S.) in Harlem, New York, was founded on innovative structure as a single-sex school serving females from backgrounds of poverty.

> The mission of Y.W.L.S. is to nurture young women in leadership roles in a global society, through a community dedicated to rigorous educational and cultural experiences. To ensure that students graduate from college, we will prepare young women to succeed in all fields, particularly: math, science, technology, leadership, and wellness (Retrieved May 20, 2009, from www.irmarangelywls.com).

"Interest in single-sex public schools as a solution for low-income and minority students is supported by research showing that students' educational experiences vary by gender within and across ethnic and racial groups" (Datnow, 2005, p. 116). Fordham (1996) revealed that low teacher expectations of African American males negatively impacted their achievement. Typically, teacher expectations for the academic performance for low-income and African American students are lower than for middle- and upper-income Caucasian students (Diamond, et al, 2006).

William Jenkins (2004) argued in his book, *Educating and Understanding African American Children*, that black males living in urban poverty are "programmed for failure" (p. 42). Jenkins (2004) believes "the key is intervening at the right point and basing intervention strategies upon an accurate understanding of the Black male and his condition" (p.42). Jenkins (2004) lists four factors that he believes contribute to the lack of success of Black males in school and in life.

First, many Black male students have an insufficient and distorted definition of manhood, resulting in a self-deprecating mind-set toward gender, sex, and the male-female relationship. Young Black males build their definition of manhood by their exposure to Black males in the neighborhood and what they see on television. More often

than not, young Black males are negatively influenced by environmental factors associated with inner city life and define manhood in terms of sex, toughness, and athletics (Jenkins, 2004). Jenkins believes it is imperative that educators understand this aspect of young Black males living in poverty and teach the importance of intelligence, compassion and understanding, because these characteristics and behaviors are seen as weaknesses (Jenkins, 2004).

Secondly, young Black boys are confused with a fixation with outward cultural blackness. Seldom do formative Black males living in poverty come into contact with Black men who have a positive concept of their place in America. All too often, urban African American boys accept and strive for a stereotypical image of "anti-education and anti-refinement" (Jenkins, 2004, p. 45). Few educators understand the social pressure that forces inner city Black males to conform and rebel against education and its demands for conformity (Jenkins, 2004).

Next, Jenkins (2004) contends there is a basic mistrust of American institutions. Young Black males "mistrust the police, the court system, the government, big business and anything that is controlled by Whites" (Jenkins, 2004, p. 46). There is an overriding belief that Black males lack a place in our country and that education will not lead them to the material things that they desire. Consequently, they choose a "path of crime over a path of compliance" (Jenkins, 2004, p. 46). Unfortunately, sometimes crime is tolerated and discretely accepted as a norm in the urban Black community (Jenkins, 2004).

Lastly, the absence of a positive male authority figure in the home has sometimes contributed to an unstructured life. Over 60 percent of Black children live in single-parent homes, most of which are run by females. Young Black males emerge into society

without the skills to interact and work effectively with men. Since they haven't had opportunities to exercise skills for compromise and negotiations, sometimes confrontations end in violence (Jenkins, 2004).

> African American males challenge schools in many ways. Perhaps the single most important challenge that has garnered recent attention in research reports, policy documents, and public commentary has been the increasing disparity in the educational achievement of African American males relative to their peers (Davis, 2003, p. 515).

"There is considerable confusion regarding why Black males are overrepresented in categories typically associated with negative behavioral outcomes" (Noguera, 2003, p. 431). Educators of urban males must seek to understand the culture in which their students are living. Culturally competent teachers can specifically target preventing such negative patterns of thinking to occur through early intervention strategies (Jenkins, 2004).

Jawanza Kunjufu calls the poor transition that African American boys make between the primary and intermediate elementary grades the "Fourth Grade Failure Syndrome" (Kunjufu, 2005, p. 34). Harry Morgan (1980) advocates for high quality teaching staff who commit to creating a more nurturing environment in the intermediate elementary grades where much of the "activity is child-teacher centered and child-child interactive" (p. 49).

After analyzing research following 20 African American male students who were randomly selected in third grade, Kunjufu (2005) reviewed their academic performance on the Iowa Reading Test five years later. Kunjufu reported unsettling reading growth

statistics. Fourteen students significantly decreased, four students improved and two remained the same (Kunjufu, 2005).

In 1985, Kunjufu made a recommendation that was not well received by the American Civil Liberties Union (ACLU), National Organization for Women (N.O.W), or proponents of Title IX, "If we cannot do a better job of developing African American boys to their fullest potential, then I recommend an extreme solution- the design of a Black male classroom" (Kunjufu, 2005, p. 50).

Twenty years later, the government and educational leaders recognize the potential effectiveness of instructing students in single-sex classrooms. Kunjufu (2005) recommends the following major components of a single-sex program that would foster growth for Black males:

> Black male teachers, no more than 20-24 students per class, cooperative learning, Self Esteem Through Culture Leads to Academic Success (SETCLAE) Curriculum, physical education, nutritious daily meals, a science lab, martial arts, phonics, musical instruments, whole-brain lesson plans and tests, word-problems, junior business league, corporate sponsors for summer employment, academic contests and assemblies, monthly parent meetings, and chess (Kunjufu, 2005, p. 50)

Some criticize Kunjufu's design for a single-sex African American male class saying that it is discriminatory and promotes segregation. Kunjufu points out that those critics fail to recognize that 75 percent or more of African American boys in exceptional education and remedial classes are already segregated (Kunjufu, 2005).

It is clear from the research that single-sex schooling in the public arena has received much attention. The opinions and findings of the research depict the mixed impact of this organizational structure.

CHAPTER III

METHODOLOGY

Introduction

This chapter describes the design of the study, population and sample, research questions, methods and procedures, data analysis and reliability. The primary purpose of this inquiry was to identify the impact of single-sex class structure on mathematics and reading student achievement and gains in these subjects on fourth and fifth grade students in Title I federally assisted dual academy schools in Hamilton County, Tennessee. In order to explore these concepts, the following design was employed to conduct the research.

Research Questions and Related Hypotheses

Each research question was carefully scrutinized and a suitable quantitative measure for establishing differences between the means was established and reported. The research questions were as follows:

1. Is there a statistically significant difference in mathematics TCAP NCE achievement scores of fourth and fifth grade males and female students in single-sex classes compared to male and female students in coeducational classes respectively within the same set of schools?

Hypothesis 1: There are no statistical differences in mathematics TCAP NCE achievement scores of fourth and fifth grade male and female students who were in single-sex classes compared to male and female students who were taught in coeducational classes respectively within the same set of schools.

2. Is there a statistically significant difference in mathematics TCAP NCE achievement scores of fourth grade males and female students in single-sex classes compared to male and female students in coeducational classes respectively within the same set of schools?

Hypothesis 2: There are no statistical differences in mathematics TCAP NCE achievement scores of fourth grade male and female students who were in single-sex classes compared to male and female students who were taught in coeducational classes respectively within the same set of schools.

3. Is there a statistically significant difference in mathematics TCAP NCE achievement scores of fifth grade males and female students in single-sex classes compared to male and female students in coeducational classes respectively within the same set of schools?

Hypothesis 3: There are no statistical differences in mathematics TCAP NCE achievement scores of fifth grade male and female students who were in single-sex classes compared to male and female students who were taught in coeducational classes respectively within the same set of schools.

4. Is there a statistically significant difference in mathematics HCVAS academic gain scores of fourth and fifth grade male and female students in single-sex classes compared to male and female students in coeducational classes respectively within the same set of schools?

Hypothesis 4: There are no statistical differences in mathematical HCVAS academic gain scores of fourth and fifth grade male and female students who were in single-sex classes

compared to male and female students who were taught in coeducational classes respectively within the same set of schools.

5. Is there a statistically significant difference in mathematics HCVAS academic gain scores of fourth grade male and female students in single-sex classes compared to male and female students in coeducational classes respectively within the same set of schools?

Hypothesis 5: There are no statistical differences in mathematical HCVAS academic gain scores of fourth grade male and female students who were in single-sex classes compared to male and female students who were taught in coeducational classes respectively within the same set of schools.

6. Is there a statistically significant difference in mathematics HCVAS academic gain scores of fifth grade male and female students in single-sex classes compared to male and female students in coeducational classes respectively within the same set of schools?

Hypothesis 6: There are no statistical differences in mathematical HCVAS academic gain scores of fifth grade male and female students who were in single-sex classes compared to male and female students who were taught in coeducational classes respectively within the same set of schools.

7. Is there a statistically significant difference in mathematics TCAP NCE achievement scores of male and female fourth and fifth grade students in single-sex classes compared to the academic gains of male and female fourth grade students in coeducation classes within the same set of schools?

Hypothesis 7: There are no statistical differences in mathematics TCAP NCE achievement scores of fourth and fifth grade male and female students who were in single-sex classes compared to male and female students who were taught in coeducational classes respectively within the same set of schools.

8. Is there a statistically significant difference in mathematics TCAP NCE achievement scores of male and female fourth grade students in single-sex classes compared to the academic gains of male and female fourth grade students in coeducation classes within the same set of schools?

Hypothesis 8: There are no statistical differences in mathematics TCAP NCE achievement scores of fourth grade male and female students who were in single-sex classes compared to male and female students who were taught in coeducational classes respectively within the same set of schools.

9. Is there a statistically significant difference in mathematics TCAP NCE achievement scores of male and female fifth grade students in single-sex classes compared to the academic gains of male and female fourth grade students in coeducation classes within the same set of schools?

Hypothesis 9: There are no statistical differences in mathematics TCAP NCE achievement scores of fifth grade male and female students who were in single-sex classes compared to male and female students who were taught in coeducational classes respectively within the same set of schools.

10. Is there a statistically significant difference in reading HCVAS academic gain scores of fourth and fifth grade male and female students in single-sex classes

compared to the academic gains of fourth grade male and female students in coeducation classes respectively within the same set of schools?

Hypothesis 10: There are no statistical differences in reading HCVAS academic gain scores of fourth and fifth grade male and female students who were in single-sex classes compared to male and female students who were taught in coeducational classes respectively within the same set of schools.

11. Is there a statistically significant difference in reading HCVAS academic gain scores of fourth grade male and female students in single-sex classes compared to the academic gains of fourth grade male and female students in coeducation classes respectively within the same set of schools?

Hypothesis 11: There are no statistical differences in reading HCVAS academic gain scores of fourth grade male and female students who were in single-sex classes compared to male and female students who were taught in coeducational classes respectively within the same set of schools.

12. Is there a statistically significant difference in reading HCVAS academic gain scores of fifth grade male and female students in single-sex classes compared to the academic gains of fourth grade male and female students in coeducation classes respectively within the same set of schools?

Hypothesis 12: There are no statistical differences in reading HCVAS academic gain scores of fifth grade male and female students who were in single-sex classes compared to male and female students who were taught in coeducational classes respectively within the same set of schools.

Quantitative Research Design

This study involved a quasi-experimental comparative approach to explore the extant data available. Thus, no pretest and no random assignment of subjects were involved in this research. Mathematics and reading NCE scores were analyzed from Tennessee Comprehensive Assessment Program (TCAP) for academic achievement and similarly HCVAS gains scores were analyzed to gain insight as to the impact of single-sex class structure on academic gains. Normal Curve Equivalent (NCE) test scores were reported on a scale that ranged from 1 to 99 with an average of 50. NCE scores are somewhat equal to percentiles with the assumption that if plotted within a normally distributed population, the result will be a bell shape curve.

HCVAS scores for participants in this study were calculated by the Hamilton County Department of Education, Office of Testing and Accountability. Although NCE scores were used in calculating the HCVAS scores, in some instances these numbers were represented in negative number values. This was due to students losing ground in a subject area from the first year to the second year in a subject. For example, if student Julian scored 62 in Mathematics NCE in year 1 as a fourth grader and the next year as a fifth grader scored a predicted 59 in Mathematics NCE, her score would be reported as -3. This is a simplified explanation of HCVAS. (See Appendices C and D for further explanation).

To answer the research questions, TCAP NCE reading and mathematics academic achievement data were analyzed for differences and the results reported. Similarly, HCVAS gain scores were calculated by Hamilton County Department of Education for students in single-sex classes and coeducational classes; these were also analyzed for

differences and reported. Written summaries representing the population sample and control group, as well as summaries describing any differences in means noted, were provided. For each of the research questions one-way analyses of variance to test differences in the means of the four class type groups (SF=Females taught in single-sex classes, SM=males taught in single sex classes, CF= females taught in coeducational classes and CM=males taught in coeducational classes) were compared to identify any statistical differences. Means with significant differences were isolated and reported.

Description of Population and Sample

The target population for this study was 850 fourth and fifth grade students in seven Title I dual academy elementary schools in Chattanooga, Tennessee. The experimental group was comprised of 347 students who were identified as students taught in single-sex classrooms during the 2008 school year. The balance of 503 students was considered the control group. These students were taught in coeducational classrooms within six of the seven schools involved in this study. One school only offered single-sex classes in fourth and fifth grade. The experimental group and the control group of fourth and fifth grade students included females and males.

For the purposes of this study, fourth grade and fifth grade students were disaggregated into four class types: female students taught in single-sex classes, male students taught in single-sex classes, female students taught in coeducational classes and male students taught in coeducational classes. This sample was selected by identifying students who were enrolled in one of the seven dual academy Title I elementary schools for the entire year during the 2007-2008.

Variables

Independent Variables

There were two types of independent variables in this study:

1. Grade levels of students with three groups: combined fourth and fifth grades, only fourth grade, and only fifth grade.
2. Class type of students with four groups: SF=Females taught in single-sex classes, SM=males taught in single sex classes, CF= females taught in coeducational classes and CM=males taught in coeducational classes.

Dependent Variables

The dependent variables were the four measures:

1. NCE TCAP Mathematics Achievement Scores
2. HCVAS Mathematics Gain Scores
3. NCE TCAP Reading Achievement Scores
4. HCVAS Reading Gain Scores

Quantitative Data Analysis

TCAP NCE reading and mathematics academic performance data and HCVAS mathematics and reading gains were collected for 347 male and female fourth and fifth grade students who were taught in single-sex classrooms in one of seven Title I Hamilton County elementary schools in 2007-2008. These students represented the experimental group. A control group consisted of all fourth and fifth graders who were taught in coeducational classes in the same seven schools. Data on these students were collected on mathematics and reading using TCAP NCE achievement data and mathematics and reading as well as HCVAS academic gains data of 503 fourth and fifth grade students

who were taught in coeducational classrooms in the identical six schools. One school only had single-sex classes in fourth and fifth grade. For all participants in this study, HCVAS, a mathematics and reading value-added academic gain score, was calculated by the Office of Testing and Accountability, Hamilton County Schools.

HCVAS and TCAP NCE scores of students in single-sex classrooms and students in coeducational classrooms were carefully analyzed using a one-way ANOVA for identify significant differences of academic achievement by classroom structure. Afterwards, Student-Neuman-Keuls analyses were employed to discern where means were significantly different for ANOVAS with significant F ratios.

CHAPTER IV

FINDINGS

Introduction

The quantitative research focus for this study included investigating for any statistically significant differences in mathematics and reading academic achievement and gains of fourth and fifth grade students who were taught in single-sex classes compared to peers in coeducational classes within the same seven high poverty public schools. After data were collected, the design for the analysis included an inferential analysis of the data.

Research Procedures

The primary purpose of this research was to compare the impact of single-sex class structure and coeducational class structure on mathematics and reading student academic achievement and academic gains in high poverty Title I federally assisted schools in Hamilton County, Tennessee. The following research questions were carefully scrutinized and one-way analyses of variances and post-hoc Student-Newman-Keuls statistical tests were calculated. The research questions were as follows:

1. Is there a statistically significant difference in mathematics TCAP NCE achievement scores of fourth and fifth grade male and female students in single-sex classes compared to male and female students in coeducational classes respectively within the same set of schools?
2. Is there a statistically significant difference in mathematics TCAP NCE achievement scores of fourth grade male and female students in single-sex classes

compared to male and female students in coeducational classes respectively within the same set of schools?

3. Is there a statistically significant difference in mathematics TCAP NCE achievement of fifth grade male and female students in single-sex classes compared to male and female students in coeducational classes respectively within the same set of schools?

4. Is there a statistically significant difference in mathematics HCVAS gains of male and female fourth and fifth grade students in single-sex classes compared to the academic gains of male and female fourth grade students in coeducation classes respectively within the same set of schools?

5. Is there a statistically significant difference in mathematics HCVAS gains of male and female fourth grade students in single-sex classes compared to the academic gains of male and female fourth grade students in coeducation classes respectively within the same set of schools?

6. Is there a statistically significant difference in mathematics HCVAS gains of male and female fifth grade students in single-sex classes compared to the academic gains of male and female fourth grade students in coeducation classes respectively within the same set of schools?

7. Is there a statistically significant difference in reading TCAP NCE achievement of fourth and fifth grade male and female students in single-sex classes compared to the academic gains of fourth grade male and female students in coeducation classes respectively within the same set of schools?

8. Is there a statistically significant difference in reading TCAP NCE achievement of fourth grade male and female students in single-sex classes compared to the academic gains of fourth grade male and female students in coeducation classes respectively within the same set of schools?

9. Is there a statistically significant difference in reading TCAP NCE achievement of fifth grade male and female students in single-sex classes compared to the academic gains of fourth grade male and female students in coeducation classes respectively within the same set of schools?

10. Is there a statistically significant difference in reading HCVAS of fourth and fifth grade male and female students in single-sex classes compared to the academic gains of fourth grade male and female students in coeducation classes respectively within the same set of schools?

11. Is there a statistically significant difference in reading HCVAS of fourth grade male and female students in single-sex classes compared to the academic gains of fourth grade male and female students in coeducation classes respectively within the same set of schools?

12. Is there a statistically significant difference in reading HCVAS of fifth grade male and female students in single-sex classes compared to the academic gains of fourth grade male and female students in coeducation classes respectively within the same set of schools?

TCAP NCE reading and mathematics scores and HCVAS gains for reading and mathematics were analyzed to determine the means of the four types of class groupings: SF= females taught in single-sex classes, SM= males taught in single-sex classes, CF=

females taught in coeducational classes and CM= males taught in coeducational classes. Using one-way ANOVA and for those with significant F ratios Student-Neuman-Keuls, significant differences of means between groups were determined. Each research question was answered by analyzing and reporting TCAP NCE reading and mathematics academic achievement data and NCE reading and mathematics data to gain insight as to the impact of single-sex class versus coeducational class structure on academic achievement. Tables and written summaries were provided for comparing the experimental and control groups along with a full description of any statistical findings. For each of the research questions, tabular representations of summary and inferential statistics were included.

Demographics

The population for this study, 850 male and female students, were organized in four groups by class type: female students taught in single-sex classes, male students taught in single-sex classes, female students taught in coeducational classes and male students taught in coeducational classes. Student demographics were disaggregated by fourth and fifth grade participants in the experimental group by school as illustrated in Tables 4.1 and Table 4.2. Students in the control group were illustrated in Tables 4.3 and 4.4. In addition to disaggregating demographic data by sex, economically disadvantaged students were coded with the symbol ED. Economically disadvantaged students were defined as those who participated in the free or reduced lunch program and were offered a daily free or reduced priced breakfast and lunch based on limited total family income that met criteria which qualified a family for food stamps or identified the family as

having met federal poverty guidelines. The race of all participants was indicated by the following symbols: AA= African American, W= White, H=Hispanic, and As=Asian.

Table 4.1
Fourth Grade Demographics of Students taught in Single-Sex Classes (N=102)

School	Female	Male	Total	ED	AA	W	H	As
1	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-
6	0	13	13	13	11	2	0	0
7	43	48	91	89	55	6	30	0
Totals	43	61	104	102	66	8	30	0

Table 4.2
Fifth Grade Demographics of Students Taught in Single-Sex Classes (N=245)

School	Female	Male	Total	ED	AA	W	H	As
1	19	17	36	20	0	33	2	1
2	20	22	42	29	10	24	6	2
3	18	0	18	13	2	14	2	0
4	17	15	32	19	22	10	0	0
5	19	20	39	35	26	11	2	0
6	-	-	-	-	-	-	-	-
7	38	40	78	76	52	7	19	0
Total	131	112	245	192	112	99	31	3

Table 4.3
Fourth Grade Demographics of Students Taught in Coeducational Classes (N=322)

School	Female	Male	Total	ED	AA	W	H	As
1	17	22	39	23	1	36	1	1
2	31	32	63	35	9	43	9	2
3	37	37	74	62	21	48	2	3
4	32	20	52	38	47	3	1	1
5	24	18	42	37	27	15	0	0
6	26	26	52	49	36	11	5	0
7	-	-	-	-	-	-	-	-
Total	167	155	322	244	141	155	18	7

Table 4.4
Fifth Grade Demographics of Students Taught in Coeducational Classes (N=181)

School	Female	Male	Total	ED	AA	W	H	As
1	8	9	17	10	1	16	0	0
2	16	26	42	30	13	24	5	0
3	14	4	18	15	7	10	1	0
4	7	8	15	12	10	5	0	0
5	11	6	17	16	11	6	0	0
6	44	28	72	70	47	17	8	0
7	-	-	-	-	-	-	-	-
Total	100	81	181	153	89	62	14	0

Instrumentation

For purposes of standardization, TCAP reading and mathematics testing data for 2008 from male and female students taught in fourth and fifth grades in seven elementary schools were analyzed. HCVAS scores were calculated by the Hamilton County Department of Education, Office of Testing and Accountability for these students in single-sex classes and coeducational classes. De-identified data were reported to the researcher from the extant data base at Hamilton County Schools Office of Testing and Accountability. Student academic scores and the name of the school the students attended were coded with identification numbers to protect the students' and schools' identification prior to data being released to the researcher. Normal Curve Equivalent (NCE) test scores were reported on a scale that ranged from 1 to 99 with an average of 50. NCE scores are somewhat equal to percentiles with the assumption that if plotted within a normally distributed population, the result will be a bell shape curve. HCVAS calculations were reported by The Office of Testing and Accountability, Hamilton County Schools, Tennessee, that determined an individual's rate of improvement based on year 1 NCE scores compared to year 2 predicted NCE scores in a subject area. In some instances these numbers were represented in negative number values because the students lost ground in a subject area from the first year to the second year in a subject. For example if student Julian scored 62 in Mathematics NCE in year 1 as a fourth grader and the next year as a fifth grader scored 59 in Mathematics NCE, her score would be reported as -3. This is a simplified explanation of HCVAS. (See Appendices C and D for further explanation).

Results of Research Questions and Data Analysis

The results for the research questions were reported in four sections: Mathematics TCAP NCE Analyses, Mathematics HCVAS Analyses, Reading TCAP NCE Analyses, and Reading HCVAS Analyses. Under each section, the grade levels of students were reported for three groups: combined fourth and fifth grades, only fourth grade, and only fifth grade. The class type of students was reported through four groups: single-sex females, single-sex males, coeducational females, and coeducational males.

Mathematics TCAP NCE Analyses for Fourth and Fifth Grade Combined

1. Question: Were there statistically significant differences in mathematics TCAP NCE achievement scores of fourth and fifth grade male and female students in single-sex classes compared to male and female students in coeducational classes respectively within the same set of schools?

A one-way analysis of variance was conducted to evaluate the relationship between fourth and fifth grade female students in single-sex classes, female students in coeducational classes, male students in single-sex classes and male students in coeducational classes. The dependent variable was the TCAP NCE mathematics achievement score. The ANOVA was not significant, $F(3)= .52$, $p=.672$. No differences in means were noted in class type groups of students on TCAP NCE mathematics achievement. The result of the one-way ANOVA supported the null hypothesis that there were no differences in fourth and fifth grade female students in single-sex classes, female students in coeducational classes, male students in single-sex classes and male students in coeducational classes compare in mathematics achievement within the same set of schools illustrated in Table 4.5 and Table 4.6.

Table 4.5
Means and SD for Fourth and Fifth Grades NCE Mathematics Achievement

Class Type	*N*	*M*	*SD*
(SF) Single-sex females	154	44.58	14.95
(SM) Single-sex males	246	45.85	15.43
(CF) Coeducational females	193	46.73	18.28
(CM) Coeducational males	257	45.79	17.88

Table 4.6
One-Way Analysis of Variance for Fourth and Fifth Grades NCE Mathematics Achievement Scores

	Sum of Squares	*df*	*MS*	*F*	*p*
Between groups	445.11	3	148.37	.52	.672
Within Groups	243917.75	846	288.31		
Total	244362.87	849			

Mathematics TCAP NCE Analyses for Fourth Grade Only

2. Question: Were there statistically significant differences in mathematics TCAP NCE achievement scores of fourth grade male and female students in single-sex classes compared to the academic gains of fourth grade male and female students in coeducation classes within the same set of schools?

A one-way analysis of variance was conducted to evaluate whether the mean differences between the four class type groupings were significant or not. The dependent variable was the TCAP NCE mathematics achievement score. In the case of fourth grade mathematics TCAP NCE scores, the differences in means were not significant, F(3)= .12,

p=.948. No strength was noted in a relationship between class type grouping on TCAP NCE mathematics achievement. The result of the one-way ANOVA supported the null hypothesis that there were no differences in how fourth grade female students in single-sex classes, female students in coeducational classes, male students in single-sex classes and male students in coeducational classes compared in mathematics achievement within the same set of schools illustrated in Table 4.7 and Table 4.8.

Table 4.7
Means and SD for NCE Mathematics Achievement Scores – 4th Grade

Class Type	*N*	*M*	*SD*
(SF) Single-sex females	43	45.68	14.08
(SM) Single-sex males	61	47.12	15.11
(CF) Coeducational females	157	46.53	18.39
(CM) Coeducational males	165	47.28	18.13

Table 4.8
One-Way Analysis of Variance of TCAP NCE Mathematics Achievement Scores- 4th Grade

	Sum of Squares	*df*	*MS*	*F*	*p*
Between groups	109.83	3	36.61	.12	.948
Within groups	128648.14	422	304.85		
Total	128757.97	425			

Mathematics TCAP NCE Analyses for Fifth Grade Only

3. Question: Were there statistically significant differences in mathematics TCAP NCE achievement scores of fifth grade male and female students in single-sex

classes compared to the academic gains of fifth grade male and female students in coeducation classes within the same set of schools?

A one-way analysis of variance was conducted to evaluate whether the mean differences between the four groupings were significant or not. The dependent variable was the TCAP NCE mathematics achievement score. In the case of TCAP mathematics achievement of fifth grade students the differences in means was not significant, F(3)= 1.11, p=.345. No strength was noted in a relationship between class type on TCAP NCE mathematics achievement. The result of the one-way ANOVA supported the null hypothesis that there were no differences in fifth grade female students in single-sex classes, female students in coeducational classes, male students in single-sex classes and male students in coeducational classes compare in mathematics achievement within the same set of schools illustrated in Table 4.9 and 4.10.

Table 4.9
Means and SD for TCAP NCE Mathematics Achievement Scores – 5th Grade

Class Type	*N*	*M*	*SD*
(SF) Single-sex females	111	44.16	15.35
(SM) Single-sex males	132	45.26	15.60
(CF) Coeducational females	100	47.04	18.19
(CM) Coeducational males	81	42.77	17.08

Table 4.10
One-Way Analysis of Variance of TCAP NCE Mathematics Achievement Scores- 5th Grade

	Sum of Squares	*df*	*MS*	*F*	*p*
Between groups	903.49	3	301.16	1.11	.345
Within groups	113932.67	420	271.26		
Total	114836.17	423			

Mathematics HCVAS Analyses for Fourth and Fifth Grade Combined

4. Question: Were there statistically significant differences in mathematics HCVAS academic gain scores of fourth and fifth grade male and female students in single-sex classes compared to male and female students in coeducational classes respectively within the same set of schools?

A one-way analysis of variance was conducted to evaluate the relationship between fourth and fifth grade female students in single-sex classes, female students in coeducational classes, male students in single-sex classes and male students in coeducational classes. The dependent variable was the HCVAS for mathematics gains. the ANOVA was not significant, F(3)= 2.56, p=.054. No strength was noted in a relationship between class type on HCVAS mathematics gains. The result of the one-way ANOVA supported the null hypothesis that there were no differences in fourth and fifth grade female students in single-sex classes, female students in coeducational classes, male students in single-sex classes and male students in coeducational classes compare in mathematics gains within the same set of schools illustrated in Table 4.11 and Table 4.12. Therefore, the null hypothesis was accepted.

Table 4.11
Means and SD for Fourth and Fifth Grades HCVAS Mathematics Gains

Class Type	*N*	*M*	*SD*
(SF) Single-sex females	154	-4.41	10.24
(SM) Single-sex males	246	-1.87	12.62
(CF) Coeducational females	193	-4.45	11.26
(CM) Coeducational males	257	-4.71	12.66

Table 4.12
One Way Analysis of Variance for Fourth and Fifth Grade of HCVAS Mathematics Gains

	Sum of Squares	*df*	*MS*	*F*	*p*
Between groups	1076.57	3	358.85	2.56	.054
Within groups	118434.61	846	139.99		
Total	119511.12	849			

Mathematics HCVAS Analyses for Fourth Grade Only

5. Question: Were there statistically significant differences in mathematics HCVAS academic gain scores of fourth grade male and female students in single-sex classes compared to the academic gains of fourth grade male and female students in coeducation classes respectively within the same set of schools?

A one-way analysis of variance was conducted to evaluate whether the mean differences between the fourth grade female students in single-sex classes, female students in coeducational classes, male students in single-sex classes and male students in coeducational classes were significant or not. The dependent variable was the HCVAS mathematics gains. In the case of fourth grade HCVAS mathematics gains, the difference

was significant, F(3)= 5.74, p=.001. Strength was noted in a relationship between class type on TCAP NCE mathematics achievement illustrated in Table 4.13 and Table 4.14.

Table 4.13
Means and SD for HCVAS Mathematics Gain Scores – 4th Grade

Class Type	*N*	*M*	*SD*
(SF) Single-sex females	43	-2.64	11.07
(SM) Single-sex males	61	2.59	13.05
(CF) Coeducational females	165	-4.92	12.56
(CM) Coeducational males	157	-4.56	13.18

Table 4.14
One-Way Analysis of Variance of HCVAS Mathematics Gain Scores- 4th Grade

	Sum of Squares	*df*	*MS*	*F*	*p*
Between groups	2796.86	3	932.29	5.74	.001
Within groups	68515.30	422	162.35		
Total	71312.17	425			

Follow-up tests were conducted to evaluate pairwise differences among the means. Because the standard deviations among the four groups ranged from 11.07 to 13.18, the researcher chose to assume the variances were homogeneous and conducted post-hoc comparisons with the use of Student-Newman-Keuls, a test that assumes equal variances among the four groups. The means were subjected to the SNK method which found that males in single-sex classes scored significantly higher than females in single-sex classes, males in coeducational classes, and females in coeducational classes.

Although female students in single-sex classes scored higher than males and females in coeducational classes, it was not significantly different than single-sex males. Results from the SNK analysis of HCVAS mathematics gains of fourth grade students by class type, illustrated in Tables 5.15 and Figure 4.1, indicate the following results, which were significant:

SM > SF: Single-sex males attained higher mathematics gains than single-sex females.

SM > CM: Single-sex males attained higher mathematics gains than coeducational males.

SM > CF: Single-sex males attained higher mathematics gains than coeducational females.

The results of the one-way ANOVA and SNK reject the null hypothesis that there were no differences in how fourth grade female students in single-sex classes, female students in coeducational classes, male students in single-sex classes and male students in coeducational classes compared in mathematics gains within the same set of schools.

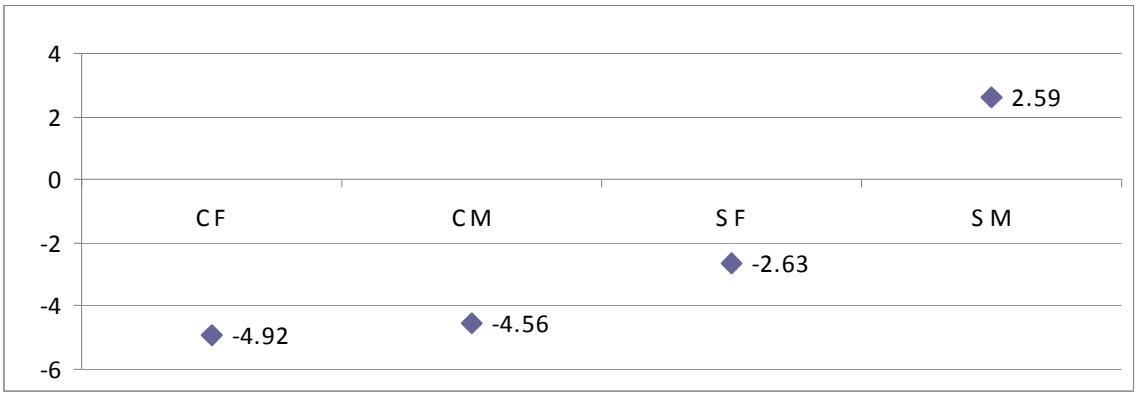
Table 4.15
Post-Hoc Student-Newman-Keuls Analyses of Means for HCVAS Mathematics Gain Scores- 4th Grade only

Class Type	Group 1	*Group 2*
Coeducational females	-4.92	
Coeducational males	-4.56	
Single-sex females	-2.63	
Single-sex males		2.59

* Means in Group 2 are different from all means in Group 1.

Figure 4.1

Means of HCVAS Mathematics Gain Scores- 4th Grade only



Mathematics HCVAS Analyses for Fifth Grade Only

6. Question: Were there statistically significant differences in mathematics HCVAS academic gain scores of fifth grade male and female students in single-sex classes compared to the academic gains of fifth grade male and female students in coeducation classes respectively within the same set of schools?

A one-way analysis of variance was conducted to evaluate whether the mean differences between the four class type groupings were significant or not. The dependent variable was the HCVAS mathematics gains. In the case of fifth grade HCVAS mathematics gains, the differences in means were not significant, $F(3)= .46$, $p=.708$. No strength was noted in a relationship between class type of fifth graders on HCVAS mathematics gains. The result of the one-way ANOVA supported the null hypothesis that there were no differences in fifth grade female students in single-sex classes, female students in coeducational classes, male students in single-sex classes and male students in coeducational classes compare in mathematics gains within the same set of schools illustrated in Table 4.16 and 4.17.

Table 4.16
Means and SD for HCVAS Mathematics Gain Scores – 5th Grade

Class Type	*N*	*M*	*SD*
(SF) Single-sex females	111	-5.09	9.87
(SM) Single-sex males	132	-3.93	11.90
(CF) Coeducational females	100	-3.73	8.86
(CM) Coeducational males	81	-5.01	11.60

Table 4.17
One-Way Analysis of Variance of HCVAS Mathematics Gain Scores- 5th Grade

	Sum of Squares	*df*	*MS*	*F*	*p*
Between groups	158.44	3	52.81	.46	.708
Within groups	47859.60	420	113.95		
Total	48018.05	423			

Reading TCAP NCE Analyses for Fourth and Fifth Grade Combined

7. Question: Were there statistically significant differences in reading TCAP NCE achievement scores of fourth and fifth grade male and female students in single-sex classes compared to male and female students in coeducational classes respectively within the same set of schools?

A one-way analysis of variance was conducted to evaluate whether the mean differences between the four class groupings of fourth and fifth grades were significant or not. The dependent variable was the TCAP NCE reading achievement score. In the case of combined fourth and fifth grade TCAP NCE achievement scores, the difference in means was significant, $F(3)= 7.17$, $p=.000$. Strength was noted in the relationship

between class type and TCAP NCE reading achievement. The result of the one-way ANOVA indicated that there were differences in how fourth and fifth grade combined female students in single-sex classes, female students in coeducational classes, male students in single-sex classes and male students in coeducational classes compared in reading achievement within the same set of schools illustrated in Tables 4.18 and Table 4.19.

Table 4.18
Means and SD for Fourth and Fifth Grades for NCE Reading Achievement

Class Type	*N*	*M*	*SD*
(SF) Single-sex females	154	44.20	15.49
(SM) Single-sex males	246	42.32	16.04
(CF) Coeducational females	193	49.16	17.24
(CM) Coeducational males	257	43.57	17.10

Table 4.19
One-Way Analysis if Variance of Fourth and Fifth Grade NCE Reading Achievement

	Sum of Squares	*df*	*MS*	*F*	*p*
Between groups	6402.37	3	2134.12	7.17	.000
Within groups	233997.05	846	276.59		
Total	240399.42	849			

Follow-up tests were conducted to evaluate pairwise differences among the means. Because the standard deviations among the four groups ranged from 15.49 to 17.24, it was assumed the variances were homogeneous and post-hoc comparisons were conducted with the use of Student-Newman-Keuls, a test that assumes equal variances

among the four groups. The means were subjected to post-hoc analysis by the SNK method, which found that coeducational females scored significantly higher than single-sex females, single-sex makes and coeducational males; therefore the null hypothesis was rejected. Results from the SNK analysis of TCAP NCE reading achievement of fourth and fifth grade students by class type illustrated in Table 4.20 and Figure 4.2 indicated the following results, which were significant:

CF > SM: Coeducational females performed higher than single-sex males.

CF > CM: Coeducational females performed higher than coeducational males.

CF > SF: Coeducational females performed higher than single-sex females.

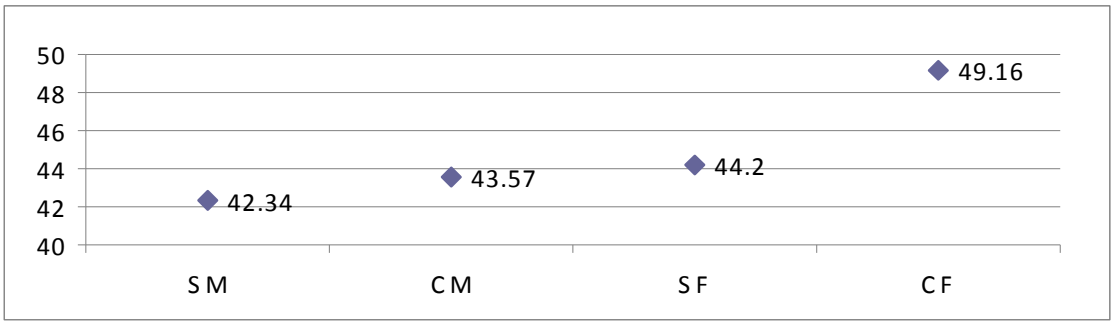
Table 4.20
Post-Hoc Student-Newman-Keuls Analyses of Means -TCAP NCE Reading Achievement-Fourth and Fifth Combined

Class Type	Group 1	Group 2
Single-sex males	42.34	
Coeducational males	43.57	
Single-sex females	44.20	
Coeducational females		49.16

* Means in Group 2 are different from all means in Group 1.

Figure 4.2

Mean Scores of TCAP NCE Reading Achievement – Fourth and Fifth Combined



Reading TCAP NCE Analyses for Fourth Grade Only

8. Question: Is there a statistically significant difference in reading TCAP NCE achievement scores of fourth grade male and female students in single-sex classes compared to male and female students in coeducational classes respectively within the same set of schools?

A one-way analysis of variance was conducted to evaluate whether the differences of means between the four class type groupings were significant or not. The dependent variable was the TCAP NCE reading achievement score. In the case of fourth grade reading TCAP NCE achievement scores the difference of means was significant, $F(3)= 9.0$, $p=.000$. Strength was noted in a relationship between class type on TCAP NCE reading achievement. The results of the one-way ANOVA indicated that there were differences in how fourth grade female students in single-sex classes, female students in coeducational classes, male students in single-sex classes and male students in coeducational classes compared in reading achievement within the same set of schools illustrated in Table 4.21 and Table 4.22. Therefore the null hypothesis was rejected.

Table 4.21
Means and SD for TCAP NCE Reading Achievement Scores – 4th Grade

Class Type	*N*	*M*	*SD*
(SF) Single-sex females	43	41.13	15.20
(SM) Single-sex males	61	39.18	13.68
(CF) Coeducational females	157	50.79	17.31
(CM) Coeducational males	165	45.03	17.66

Table 4.22
One-Way Analysis of Variance of TCAP NCE Reading Achievement Scores- 4th Grade

	Sum of Squares	*df*	*MS*	*F*	*p*
Between groups	7606.03	3	2535.34	9.00	.000
Within groups	118876.90	422	281.69		
Total	126482.93	425			

Follow-up tests were conducted to evaluate pairwise differences among the means. Because the standard deviations among the four groups ranged from 13.68 to 17.66, the researcher chose to assume the variances were homogeneous and conducted post-hoc comparisons with the use of Student-Newman-Keuls, a test that assumes equal variances among the four groups. The means were subjected to post-hoc analysis by the Student-Neuman-Keuls method, which found that females taught in coeducational classes scored significantly higher than males taught in coeducational classes and females and males taught in single-sex classes. Results from the SNK analysis of TCAP NCE reading

achievement of fourth grade students by class type, illustrated in Table 4.23 and Figure 4.3, indicate the following results, which were significant:

CF > SM: Coeducational females performed higher than single-sex males.

CF > SF: Coeducational females performed higher than single-sex females.

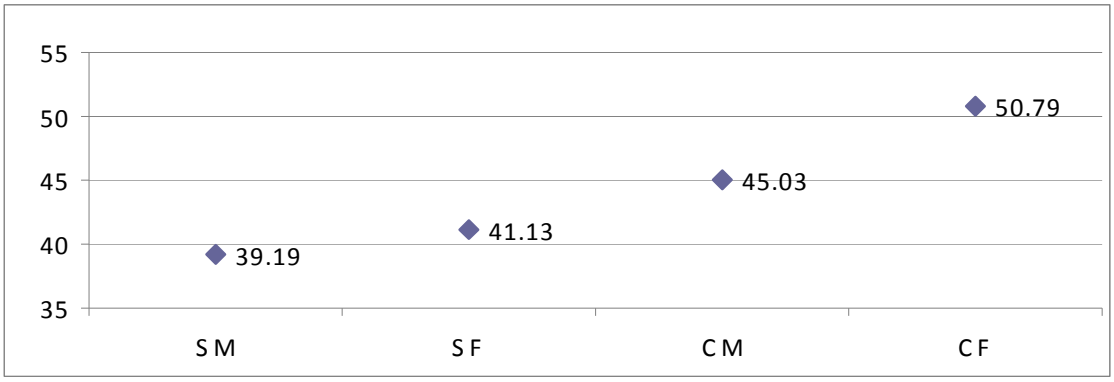
CF > CM: Coeducational females performed higher than coeducational males.

Table 4.23
Post-Hoc Student-Newman-Keuls Analyses of TCAP NCE Reading Achievement Scores Between Class Type Groups

Class Type	Group 1	Group 2
Single-sex males	39.19	
Single-sex females	41.13	
Coeducational males	45.03	
Coeducational females		50.79

* Means in Group 2 are different from all means in Group 1.

Figure 4.3
Means of TCAP NCE Reading Achievement- Fourth Grade Only



Reading TCAP NCE Analyses for Fifth Grade Only

9. Question: Is there a statistically significant difference in reading TCAP NCE achievement scores of fifth grade male and female students in single-sex classes compared to male and female students in coeducational classes respectively within the same set of schools?

A one-way analysis of variance was conducted to evaluate whether the mean differences between the four class type groupings were significant or not. The dependent variable was the TCAP NCE reading achievement score. In the case of fifth grade TCAP NCE reading achievement, the difference in means was not significant, $F(3)= 2.26$, $p=.08$. No strength was noted in a relationship between fifth grade class type on TCAP NCE reading achievement. The result of the one-way ANOVA supported the null hypothesis that there were no differences in fifth grade female students in single-sex classes, female students in coeducational classes, male students in single-sex classes and male students in coeducational classes compare in reading achievement within the same set of schools illustrated in Table 4.24 and Table 4.25.

Table 4.24
Means and SD for TCAP NCE Reading Achievement Scores – 5th Grade

Class Type	*N*	*M*	*SD*
(SF) Single-sex females	111	45.39	15.50
(SM) Single-sex males	132	43.79	16.86
(CF) Coeducational females	100	46.59	16.92
(CM) Coeducational males	81	40.59	15.60

Table 4.25
One-Way Analysis of Variance of TCAP NCE Reading Achievement Scores- 5th Grade

	Sum of Squares	*df*	*MS*	*F*	*p*
Between groups	1806.05	3	602.01	2.26	.08
Within groups	111524.54	420	265.53		
Total	113330.59	423			

Reading HCVAS Analyses for Fourth and Fifth Grade Combined

10. Question: Is there a statistically significant difference in reading HCVAS of fourth and fifth grade male and female students in single-sex classes compared to male and female students in coeducational classes respectively within the same set of schools?

A one-way analysis of variance was conducted to evaluate whether the means of differences between the four class type groups in fourth and fifth grade were significant or not. In the case of combined fourth and fifth grade HCVAS reading gain scores, the difference in means were significant; $F(3)= 4.90$, $p=.002$. The result of the one-way ANOVA analysis indicated that there were significant differences in how fourth and fifth grade female students in single-sex classes, female students in coeducational classes, male students in single-sex classes and male students in coeducational classes compared in reading gains within the same set of schools illustrated in Table 4.26 and Table 4.27. Therefore, the null hypothesis was rejected.

Table 4.26
Means and SD for Fourth and Fifth Grade HCVAS Reading Gains

Class Type	*N*	*M*	*SD*
(SF) Single-sex females	154	-4.40	10.13
(SM) Single-sex males	246	-2.18	12.56
(CF) Coeducational females	193	-5.31	10.21
(SM) Coeducational males	257	-6.11	11.46

Table 4.27
One-Way Analysis of Variance of Fourth and Fifth Grades HCVAS Reading Gains

	Sum of Squares	*df*	*MS*	*F*	*p*
Between groups	1823.96	3	607.98	4.90	.002
Within groups	104967.65	846	124.07		
Total	106791.62	849			

Follow-up tests were conducted to evaluate pairwise differences among the means. Because the standard deviations among the four groups ranged from 10.13 to 12.56, the researcher chose to assume the variances were homogeneous and conducted post-hoc comparisons with the use of Student-Newman-Keuls, a test that assumes equal variances among the four groups. The means were subjected to post-hoc analysis by the Student-Neuman-Keuls method, which found that males in single-sex classes scored significantly higher than males in coeducational classes, females in single-sex classes and females in coeducational classes. Although females in coeducational classes scored lower than females in single-sex classes, the difference was not significant. Results from the

SNK analysis of HCVAS reading gains of fourth and fifth grade students by class type, illustrated in Table 4.28 and Figure 4.4, indicate the following results which were significant:

SM > SF: Single-sex males attained higher reading gains than single-sex females.

SM > CM: Single-sex males attained higher reading gains than coeducational males.

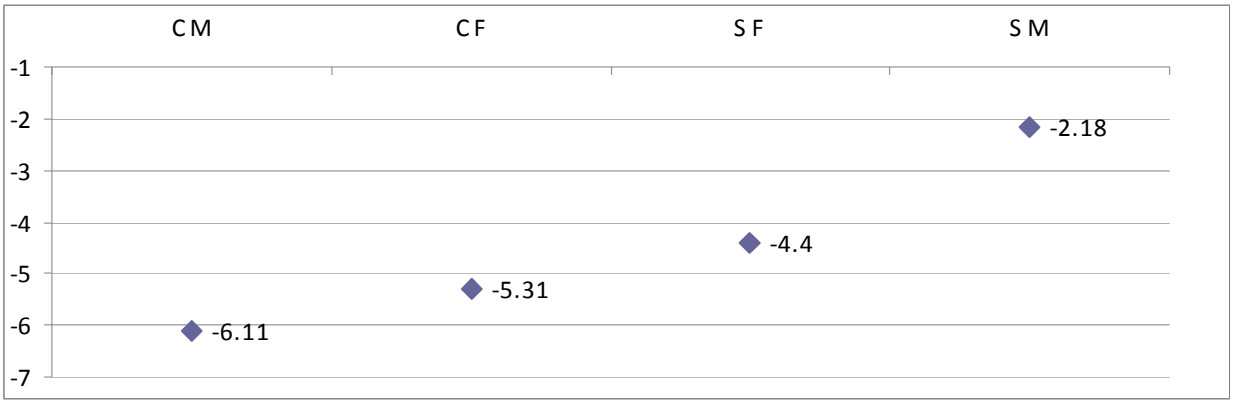
SM > CF: Single-sex males attained higher reading gains than coeducational females.

Table 4.28
Post-Hoc Student-Newman-Keuls Analyses of Means- Fourth and Fifth Grade HCVAS Reading

Class Type	Group 1	Group 2
Coeducational males	-6.11	
Coeducational females	-5.31	
Single-sex females	-4.40	
Single-sex males		-2.18

* Means in Group 2 are different from all means in Group 1.

Figure 4.4
Means of HCVAS Reading Fourth and Fifth Grade Combined



Reading HCVAS Analyses for Fourth Grade Only

11. Question: Were there statistically significant differences in HCVAS of fourth grade male and female students in single-sex classes in reading compared to the academic gains of fourth grade male and female students in coeducation classes respectively within the same set of schools?

A one-way analysis of variance was conducted to evaluate whether the means of differences between the four class type groupings were significant or not. The dependent variable was the HCVAS reading gains. In the case of fourth grade HCVAS reading gains, the difference in means were significant; $F(3)= 5.85$, $p=.001$. Strength was noted in a relationship between class type on HCVAS reading gains. The result of the one-way ANOVA indicated that there were differences in how fourth grade female students in single-sex classes, female students in coeducational classes, male students in single-sex classes and male students in coeducational classes compared in reading gains within the same set of schools illustrated in Table 4.29 and Table 4.30. Therefore, the null hypothesis is rejected.

Table 4.29
Means and SD for HCVAS Reading Gain Scores – 4th Grade

Class Type	*N*	*M*	*SD*
(SF) Single-sex females	43	-6.60	10.58
(SM) Single-sex males	61	-0.37	9.62
(CF) Coeducational females	157	-6.40	10.32
(CM) Coeducational males	165	-6.87	11.79

Table 4.30
One-Way Analysis of Variance of HCVAS Reading Gain Scores- 4th Grade

	Sum of Squares	*df*	*MS*	*F*	*p*
Between groups	2068.99	3	689.66	5.85	.001
Within groups	49724.90	422	117.83		
Total	51793.89	425			

Follow-up tests were conducted to evaluate pairwise differences among the means. Because the standard deviations among the four groups ranged from 9.62 to 11.79, the researcher chose to assume the variances were homogeneous and conducted post-hoc comparisons with the use of Student-Newman-Keuls, a test that assumes equal variances among the four groups. The means were subjected to post-hoc analysis by the Student-Neuman-Keuls method which found that males in single-sex classrooms scored significantly higher than all other class type groups. Results from the SNK analysis of HCVAS reading gains of fourth grade students by class type, illustrated in Table 4.31 and Figure 4.5, indicate the following results which were significant:

SM > CM: Single-sex males attained higher reading gains than coeducational males.

SM > SF: Single-sex males attained higher reading gains than single-sex females.

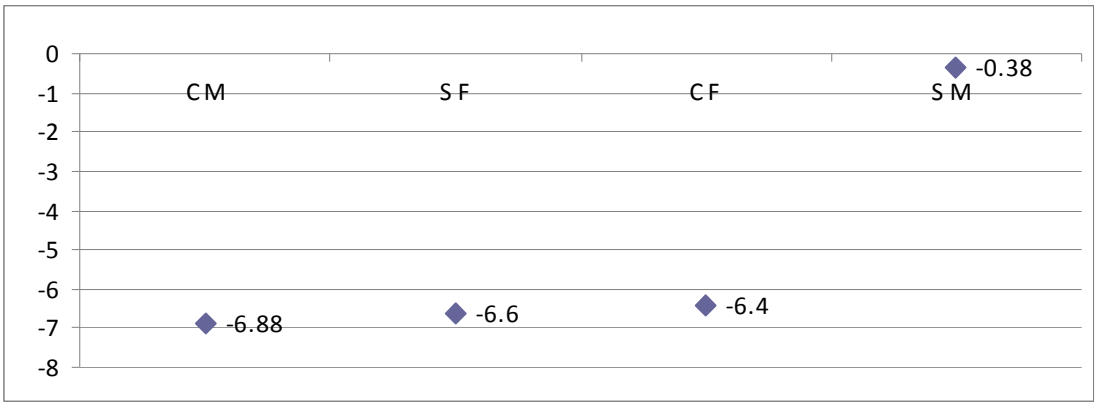
SM > CF: Single-sex males attained higher reading gains than coeducational females.

Table 4.31
Post-Hoc Student-Newman-Keuls Analyses of Means Four Grade HCVAS Reading

Class Type	Group 1	Group 2
Coeducational males	-6.88	
Single-sex females	-6.60	
Coeducational females	-6.40	
Single-sex males		-0.38

* Means in Group 2 are different from all means in Group 1.

Figure 4.5
Means of HCVAS Reading -Fourth Grade Only



Reading HCVAS Analyses for Fifth Grade Only

12. Question: Is there a statistically significant difference in reading HCVAS fifth grade male and female students in single-sex classes compared to male and female students in coeducational classes respectively within the same set of schools?

A one-way analysis of variance was conducted to evaluate whether the mean of differences between the four class type groupings were significant or not. The dependent variable was the HCVAS reading gains. In the case of fifth grade HCVAS reading gains,

the difference in means were not significant, F(3)= .30, p=.819. No strength was noted in a relationship between fifth grade class type on HCVAS reading gains. The result of the one-way ANOVA supported the null hypothesis that there were no differences in fifth male students in single-sex classes and male students in coeducational classes compare in mathematics achievement within the same set of schools illustrated in Table 4.32 and Table 4.33.

Table 4.32
Means and SD for HCVAS Reading Gain Scores – 5th Grade

Class Type	*N*	*M*	*SD*
(SF) Single-sex females	111	-3.55	9.87
(SM) Single-sex males	132	-3.01	13.66
(CF) Coeducational females	100	-3.60	9.84
(CM) Coeducational males	81	-4.55	10.65

Table 4.33
One-Way Analysis of Variance of HCVAS Reading Gain Scores- 5th Grade

	Sum of Squares	*df*	*MS*	*F*	*p*
Between groups	119.02	3	39.67	.30	.819
Within groups	53894.19	420	128.32		
Total	54013.22	423			

Summary

The results of the study shown in Tables 4.34 and 4.35 indicate that no differences in means were noted between class types in math achievement. However, when math gains were examined, males in single-sex classrooms achieved at a higher mean growth

rate than all other class types. Significant differences in reading academic achievement mean scores were discovered. Females instructed in coeducational settings had significantly higher academic achievement scores than the other class types. When reading gain scores were scrutinized, males taught in single-sex classroom settings achieved higher gains in reading than all other class types.

Table 4.34
Summary of Research Questions

Independent Variable	Dependent Variable	Null Hypothesis Accepted	Result
Fourth/fifth combined	TCAP NCE mathematics	yes	
Fourth only	TCAP NCE mathematics	yes	
Fifth only	TCAP NCE mathematics	yes	
Fourth/fifth combined	HCVAS mathematics	yes	
Fourth only	HCVAS mathematics	no	SM> CM, SF, CF
Fifth only	HCVAS mathematics	yes	
Fourth/fifth combined	TCAP NCE reading	no	CF> SF, SM, CM
Fourth only	TCAP NCE reading	no	CF> SF, SM, CM
Fifth only	TCAP NCE reading	yes	
Fourth/fifth combined	HCVAS reading	no	SM> CM, SF, CF
Fourth only	HCVAS reading	no	SM> CM, SF, CF
Fifth only	HCVAS reading	yes	

Table 4.35
Summary of Findings

Math		Reading	
TCAP NCE Achievement	HCVAS Gains	TCAP NCE Achievement	HCVAS Gains
	SM > CM > SF > CF	CF > SF > SM > CM	SM > CM > SF > CF

CHAPTER V

CONCLUSIONS, DISCUSSION, AND RECOMMENDATIONS

Chapter V represents a summary of key highlights of the dissertation by the researcher. Included in this section are the purpose of the study, methodological summary, conclusions, discussion of findings, and recommendations for further research on single-sex class structure in public elementary schools as well as recommendations for practice in high poverty public schools.

Purpose Revisited

The purpose of this study was to investigate if there were any statistically significant differences in mathematics and reading academic achievement and gains of male and female students in single-sex classes compared to male and female students in coeducational classes in fourth and fifth grades within the same set of high poverty public elementary schools.

Methodological Summary

This quantitative study involved an examination of mathematics and reading statistical data from Normal Curve Equivalent (NCE) scores from the TCAP to determine the impact of single-sex class structure on academic achievement. For purposes of standardization, TCAP reading and mathematics data from 850 male and female students taught in fourth and fifth single-sex and coeducational classes within the same set of seven schools was analyzed. Students were examined by comparing four class types: female students taught in single-sex classes, male students taught in single-sex classes, female students taught in coeducational classes and male students taught in coeducational classes. HCVAS were internally calculated by the Office of Testing and Accountability,

Hamilton County schools. Mathematics and reading HCVAS and TCAP NCE scores of students in single-sex classrooms and students in coeducational classrooms were carefully analyzed using a one-way ANOVA to identify significant differences of academic achievement by classroom structure. Afterwards, Student-Neuman-Keuls analyses were employed to discern where means were significantly different for ANOVAS with significant F ratios. Each data set was scrutinized in light of the research questions and subsequent hypotheses. A discussion of the analysis with summaries representing the findings follows.

Conclusions

Mathematics TCAP NCE Achievement Analyses

Mathematics TCAP NCE achievement data for the seven schools were disaggregated by fourth and fifth grade students combined, only fourth grade students and only fifth grade students. One-way analyses of variance were calculated for each group of female students in single-sex classes, male students in single-sex classes, female students in coeducational classes and male students in coeducational classes. No significant differences were noted for any NCE mathematics TCAP achievement scores between class type groups.

Mathematics HCVAS Academic Gains Analyses

Mathematics HCVAS academic gains data for the seven schools were disaggregated by fourth and fifth grade students combined, only fourth grade students and only fifth grade students. One-way analyses of variance were calculated for female students in single-sex classes, male students in single-sex classes, female students in coeducational classes and male students in coeducational classes. There were no

significant differences in means noted for fourth and fifth grade combined or fifth grade only for HCVAS academic gains. However, the analyses of variance and post-hoc SNK analyses for fourth graders only revealed significantly different means between the class types. Males in single sex classes achieved significantly higher gains in HCVAS mathematics than males in coeducational classes, females in single-sex classes and females in coeducational classes.

Reading TCAP NCE Achievement Analyses

Reading TCAP NCE achievement data for the seven schools were disaggregated by fourth and fifth grade students combined, only fourth grade students and only fifth grade students. One-way analyses of variance were calculated for female students in single-sex classes, male students in single-sex classes, female students in coeducational classes and male students in coeducational classes. There were no significant differences in the means noted for fifth grade only for reading TCAP NCE achievement. However, the one-way analyses of variance and post-hoc SNK analyses revealed that fourth and fifth grades combined and fourth grade only had significant differences in means for reading TCAP NCE achievement. Fourth and fifth grade students combined and only fourth grade students revealed similar results. Female students taught in coeducational classes performed significantly higher than females taught in single-sex classes, males taught in single-sex classes and males taught in coeducational classes.

Reading HCVAS Academic Gains Analyses

Reading HCVAS academic gains data for the seven schools were disaggregated by fourth and fifth grade students combined, only fourth grade students and only fifth grade students. One-way analyses of variance were calculated for female students in

single-sex classes, male students in single-sex classes, female students in coeducational classes and male students in coeducational classes for each of the three aforementioned groups. There were no significant differences in the means noted for only fifth grade students for reading in HCVAS academic gains. However, the one-way analyses of variance and post-hoc SNK analyses revealed that fourth and fifth grades combined and only fourth grade students had significant differences in means for reading HCVAS academic gains. Fourth and fifth grade combined and fourth grade only revealed similar results. Male students taught in single-sex classes performed significantly higher in HACVAS NCE reading gains than males taught in coeducational classes, females taught in single-sex classes, and females taught in coeducational classes.

Discussion

Mathematics TCAP NCE Achievement Analyses

The results showed that there were no significant statistical differences in TCAP NCE mathematics achievement between females instructed in single-sex classes, females instructed in coeducational classes, males instructed in single-sex classes and males instructed in coeducational classes. This finding aligns with research by Herbert Marsh and Kenneth Rowe (1996) where relatively little effect on mathematics achievement was found when comparing the effects of single-sex and mixed-sex instruction on students in seventh and eighth grades. However, Lee and Lockheed's (1990) study of 1,012 ninth grade students in Nigerian public schools suggested the opposite. After analyzing data drawn from the Second International Association for the Evaluation of Educational Achievement, Lee and Lockheed (1990) found that there was no apparent mathematics gender achievement gap between males and females, but females and males taught in

single-sex schools out-performed males and females instructed in coeducational settings (Haag, 2000).

Multiple factors may have contributed to the fact that no significant differences in means were noted between the mathematics TCAP NCE scores of the populations studied in this project. Although certain areas were not addressed in this study, it is possible that some of these may have played a role in the outcomes. One factor that may have affected mathematics achievement across all class types was the use of a consistent mathematics curriculum and pacing guide. A district mandate for all school-based administrators has been adopted with the goal of ensuring that all elementary teachers utilize the district's adopted mathematics curriculum, Every Day Mathematics (EDM), with fidelity. Because EDM is a cyclical curriculum building on previous learning, it is imperative that teachers utilize all components of the program so students will have the foundational skills to achieve at the next level.

Several years ago after a curriculum audit of elementary schools within the district, a pervasive concern emerged about whether elementary schools had fully embraced EDM because teachers in these schools were supplementing with numerous other curricula (C. Sims, personal communication, February 2007). Because students were receiving varying approaches to mathematical thought, accurate evaluation of the factors related to math achievement became problematic when students transferred from school-to-school within the district. It became apparent that between schools there was an incongruence of mathematical thinking that posed an achievement issue. Since that time, all elementary schools have adjusted to utilize the adopted math curriculum, EDM, with prescribed teaching strategies and activities that align to a pacing guide. In some ways

this would make EDM appear to be incompatible with single-sex instruction because it does not differentiate to meet the learning preferences of either gender.

All components of the EDM math curriculum promote problem-solving skills. "Everyday Mathematics emphasizes the application of mathematics to real world situations. Numbers, skills and mathematical concepts are not presented in isolation, but are linked to situations and contexts that are relevant to everyday lives" (Retrieved July 10, 2009, from http://everydaymath.uchicago.edu/about/). Research by McLeod and Adams (1979) linked Hermann Witkin's (1977) concept of field independence and field dependence to mathematical learning styles. Their research revealed that students with field-independent cognitive styles preferred minimum guidance and maximum opportunity for discovery through the use of manipulative materials; thus resulting in greater mathematical growth. Moreover, students who preferred field-dependence performed best with maximum mathematical guidance from the instructor (McLeod and Adams, 1979). Sax (2007) discussed brain-sex differences and preferred learning styles of male and female students. Much of Sax (2007) analyses appeared to support research by McLeod and Adams (1979) which indicated that males demonstrate learning preferences conducive to field-independence and female students favor field-dependent learning.

Because EDM offers a prescribed curriculum and because of the district's expectation that teachers will utilize EDM components faithfully as an embedded practice, this curricular variable may have greatly affected student achievement in mathematics.

Mathematics HCVAS Academic Gains Analyses

When mathematical gains were examined, fourth grade male students in single-sex classes outperformed all other class types in mathematics growth scores. This finding supports a pilot study conducted by Stetson University in Florida (2008), which compared single-sex and coeducational classrooms within the same school. All relevant parameters were the same for both the single-sex and coeducational classrooms: class size, racial demographics, and teacher training (Retrieved on July 25, 2009 from www.singlesexschools.org/reseearch-singlesexvscoed.htm). Professor Kathy Piechura-Couture (2008) reported that "over four years of the [Stetson University] pilot study, 55% of boys in coed classrooms scored proficient on the FCAT [Florida Comprehensive Assessment Test], compared with 85% of boys in all boy classes. Same class size. Same curriculum. Same demographics" (p. 2)

Moreover, the fourth grade experimental group for males taught in single-sex classrooms that had significantly higher gains in math consisted of only students from schools 6 and 7. These two schools had the highest poverty levels of the seven schools in the study, 96 percent and 96.65 percent respectively. Faculties in the elementary schools included in this study with ninety percent or more of the student body participating in the free or reduced lunch program have received extensive professional development and instructional support for teachers as a part of a district-wide initiative. One factor that may have contributed to specific gains in mathematics was the professional development afforded to the teachers in 6 and 7 faculties. Leonard Sax (2005) in his book *Why Gender Matters* discussed professional development for gender-specific teaching as a defining factor in the success of a single-sex classroom. Furthermore, Hambrook (2009) contended "simply separating boys from girls is no guarantee of anything good

happening. You need teachers who are trained in gender specific strategies; you need attention to learning styles and flexible student-centered curriculum" (p. 2).

It was also noted that the sample size of males in single-sex classes in fourth grade only consisted of 61 students in three classes. Therefore, the results should not readily be generalized to the participating schools' populations overall.

When mathematical growth scores were examined by all fourth and fifth grade students combined, as well as classes of fifth grade students only, results revealed no significant differences in means between class types. Although additional related factors were not addressed in this study, such as the strength of the mathematics instruction prior to the year scores were examined and the amount of time allotted for mathematics instruction, it is possible that these factors may have played a role in the outcomes.

Reading TCAP NCE Achievement Analyses

Statistical analyses of reading achievement revealed that fourth and fifth grades combined and classes of only fourth grade female students taught in coeducational classes performed significantly higher than all other class types in reading TCAP NCE achievement. This finding supports research by Leonard Sax (2008) which suggested that in most coeducational classrooms female teachers unknowingly design classroom instruction to be advantageous to female students and their learning styles over male students. Michael Gerardi (2006) supported this notion, stating that instructional practices in public schools favor female students over male students. "Co-educational classrooms tend to gravitate towards more feminine learning environments, if for no other reason than most teachers are female" (Retrieved February 23, 2009, from

www.eagleforum.org). Although this factor was not explored in this study, this assumption is supported by research by Sax (2008) and Gerardi (2006).

Of the 23 coeducational classrooms included in this study, 100% of the female students were taught by female teachers. Sax (2008) and Gerardi (2006) suggest that female educators instructing in coeducational settings may influence the achievement of the females in these classrooms. In this study, even at an unconscious level, teachers may have selected activities and learning strategies that were more favorable to female learning styles. This factor alone may have had an impact on the reading achievement levels of female students instructed in coeducational learning environments. In addition, the NCE achievement mean score in this study does not take into account the achievement level from the year before in reading.

It is not uncommon for females to outperform males in coeducational settings in reading achievement and thus create a gender achievement gap. In his article "The Boy Problem: Many Boys Think School is Stupid and Reading Stinks", Saks (2007) explained that the gender achievement gap is increasing between girls and boys, especially when literacy is examined. According to Sax (2007), "There has always been a gender gap in the propensity of kids to read for fun. Girls have always been more likely to read for pleasure than boys. But the gender gap has now grown so wide that it has become a marker of gender identity…girls read; boys don't" (Retrieved February 23, 2009, from http://www.schoollibraryjournal.com/index .asp).

Furthermore, Elsie Hambrook (2009) explained

> "more recently a 'boy crisis' has become a focus of concern, wherein it is suggested that boys are struggling in [coeducational] classes because the

> standard is expected from students (sitting quietly, raising your hand, reading) is more traditional behaviour for females than males. Some retort the 'crisis' as a media fabrication and a backlash against women's gains (p.1).

Several factors may have impacted the reading achievement levels of female students taught in coeducational classes. Although certain factors were not addressed in this study, it is possible that they may have played a role in females benefiting directly from the coeducational class structure.

When only fifth graders were examined by class type, no statistically significant differences in means were noted between the groups for reading academic achievement. Although this research study does not examine this factor, a focus on standards may be one reason which contributed to this finding. As fifth grade teachers attempt to prepare students for middle school, they may address content and required knowledge more and focus on engagement and motivation less. Burns, Griffin and Snow (2007) contended,

> Learning requires engagement and motivation. Success with reading is no exception. Unfortunately in middle school, interest in both recreational and academic reading decline, and most adolescents spend little time reading outsides of school. Only one in three [students] report reading voluntarily at thirteen years of age, only one of four at seventeen (p. 28).

Reading HCVAS Academic Gains Analyses

This research revealed that males in single-sex classes attained significantly higher reading gains than all other class types when students were examined as fourth and fifth graders combined and fourth grade students only. Several factors might have

contributed to this finding. Although some of these were not addressed in this study, it is possible that they may have played a role in the outcomes. Teachers of classes comprised of only male students might have been intentional about providing multiple avenues for males to demonstrate their learning that favored male learning preferences. In addition, single-sex male classrooms may have been designed with literature and learning strategies that specifically appeal to male learning styles. This supports research by Fletcher (2006) who found that teachers who create a classroom environment for males successfully structure it so that a strong social component is incorporated. According to Fletcher (2006), boys need to be provided with opportunities to work side by side with each other and have an opportunity to demonstrate their learning. Fletcher (2006) noted that teachers of single-sex males should recognize that student-choice is important, and male students become engaged when the learning environment is fun and active. Saks (2007) found that public schools which offer all-boy classes, where the format for learning is varied to accommodate for brain-sex differences, have a higher success rate in engaging male students in reading. Moreover, Walker (2004) identified benefits for males in single-sex public classrooms, noting that male students were found to increase writing and reading skills and strategies for collaboration in these settings.

As teachers in this study prepared to create a classroom structured for males, it is possible that they conducted professional reading about the need for boys to have choice in what they were reading and sought to provide materials that would be of interest to them. Additionally, Chen (2009) reported that after St. Louis, Missouri, schools implemented single-sex classes, their teachers reported that boys' learning was enhanced because the male classrooms were able to implement action-based learning activities.

> As boys tend to prefer movement-based lessons, teachers leading all boy classes have the students physically move around from activity to activity. Similarly all female classrooms also cater their plans and activities to the proclivities of the female based groups (Chen, 2009, p.2).

Another factor that might have contributed to the reading growth of males in single-sex classes could have been the teacher's sensitivity and understanding about avoiding scenarios where male students would be forced to fail publicly. Peg Tyre (2006) discussed the issue of boys experiencing private versus public failure. Tyre (2006) contended that boys look at every activity and interaction from the perspective of whether or not it will make them appear weak. If the activity is going to reveal a shortfall, more often than not boys will avoid the activity (Tyre, 2006). (Fletcher, 2006) asserted that males need certain factors for them to persevere when they have not had early success. A strong interest in the activity, a will to achieve, stamina or stubbornness to keep trying, time to practice the skill, and the space to fail privately are all factors that support male learning.

Recommendations

Recommendations for Future Research

The mixed results of this study indicate that additional investigation would enhance the information obtained from this project. It is recommended that further quantitative and qualitative research exploring single-sex education and factors that impact student achievement and academic gains be conducted.

Classroom observations as well as interviews and questionnaires from students, parents, teachers, and principals of dual academy public elementary schools would add a

qualitative element to future collection of information. Using the aforementioned tools, further inquiry could also help determine the specific instructional support resources which should be used in single-sex classes and how these might impact student performance. These factors for inquiry include: the use of differentiated materials, focused professional development, specific reading and math learning activities, curriculum resources, and teaching strategies for single-sex classrooms. Given the important finding that males instructed in single-sex classes achieved higher gains in reading and math, it is recommended that additional research take place to examine the specific professional training and strategies that were utilized in these classrooms.

Furthermore, the concept of stakeholder choice for single-sex classes, including whether or not teachers, parents, and students were given input regarding participation in a single-sex verses coeducational classroom, should be explored. Woods & Dylinski (2004) argued the importance of parental involvement in a child's education. Sax (2006) suggested that putting a teacher in a single-sex classroom for which she is not suited by temperament or training, may be a recipe for failure (Retrieved February 23, 2009, from http://www.singlesexschools.org/edweek.html). Determining how students and teachers were selected for the single-sex classes and how the classroom learning environments were structured are factors that the researcher recommends are worthy of investigation.

Furthermore, the researcher recognizes the importance of investigating the academic gains of males taught in single-sex classes. It is very important to discover whether males in single-sex classes attained larger gains in the year they were instructed in male-only classes than in previous years when in coeducational instructional settings.

Knowing if the growth trajectory was steeper the year the males were in single-sex classes has significant implications for the effectiveness of this instructional design.

Lastly, examining the teachers' gain scores from the year they taught a single-sex class compared to previous years when they taught coeducational classes would prove to be an interesting investigation.

Recommendations for Practice

The results of the study also compel school leaders to examine the instructional strategies designed to support male and female preferred learning styles. Classroom learning environments should be examined to identify how they might support the interests of males and females based on an examination of preferred learning styles. Leonard Sax (2006) and Michael Gurian (2008) contended that research that supports that male and female students learn in different ways according to brain chemistry is valuable information for educators. Saks (2007) found that public schools which offer all-boy classes, where the format for learning is varied to accommodate for brain-sex differences, have a higher success rate in engaging male students in reading (Saks, 2007). Spielhagan (2008) asserted that single-sex classes seem to be most effective when related to the developmental needs of the students. She believes that the younger the student, the more probable that they will have a positive experience in a single-sex class. Moreover, Speilhagan (2008) retorted that simply grouping students by sex will not automatically result in higher achievement. Furthermore she stated that educators must understand training for single-sex education takes place over time (Speilhagan, 2008).

It is recommended that school leaders of high poverty public elementary schools consider involving stakeholders in the decision-making process about whether or not

single-sex class structure should be implemented. A clear understanding of the reasons for a single-sex initiative should be articulated. Hubbard and Datnow (2002) contended that many single-sex classes and schools have proved unsuccessful because stakeholders did not share a set of common beliefs regarding single-sex education. A school should demonstrate an unwavering resolve to offer single-sex instruction in order for the program to be successful (Hubbard & Datnow, 2002).

The researcher also recommends that students, parents, and teachers have a choice in whether or not they participate in the single-sex class initiative. Having parents who make "a pro-academic choice" will only increase the probability for success (Weil, 2008). Speilhagan (2008) suggested "schools must involve parents in decision-making about single-sex classes. Moreover, students who opt for single-sex classes may benefit from the arrangement simply because they chose it" (Retrieved July 26, 2009 from http://rowmanblog.typepad.com/rowman/2008/05/on-single-sex-e.html).

Leonard Sax (2005), founder of the NASSPE and a leading advocate for public single-sex schooling, maintained that professional development seems to be a critical component in single-sex classroom success. "At schools where single-sex classrooms were not effective, teachers received no specific training in best practices for gender-specific teaching" (Sax, 2005, p. 34). The researcher recommends the following resources to be utilized in the professional development of teachers who teacher in a single-sex classroom or dual academy school: *Successful Single Sex Classrooms: A Practical Guide to Teaching Boys and Girls Separately (*Gurian, Stevens, & Daniels, 2009), *The Silent Gender Gap* and article in Education Week *(*Riordan, 1999), *Why*

Gender Matters: What Parents and Teachers Need to Know About the Emerging Science of Sex Differences (Sax, 2005).

Single-sex professional learning communities (PLC) could be developed to afford teachers opportunities to dialogue about ideas and instructional strategies which foster engagement of the sexes in the curriculum. The authors of *Professional Learning Communities at Work* (2005) stated, "To achieve this shared purpose, the members of a PLC create and are guided by a clear and compelling vision of what their schools and districts must become to help students learn" (Dufour, et al., 2008, p. 15).

School-based administrators should be made aware of the federal guidelines regarding the implementation of a single-sex program in a public school setting. Protheroe (2009) emphasizes the importance of effective planning for the implementation of a single-sex program. "Any program will need to satisfy the guidelines outlined in the 2006 version of the federal regulations" (Protheroe, 2009, p. 34).

On the opposing side, the AAUW, FMF, and David Sadker contend that coeducation is the best instructional design. They maintain that if a coeducational setting is not meeting the needs of either sex, then reform is needed in the coeducational model. They uphold the argument that single-sex education is not the answer to addressing the gender achievement gap that exists between the academic performance of male and female students (Bracey, 2006).

This researcher has determined that no final and definitive conclusions can be drawn about the academic performance of students enrolled in single-sex classes from this research alone. However, findings in this study revealed that in some instances males in single-sex classes made significantly higher gains in math and reading. The research

also found that females in coeducational settings had significantly higher reading achievement levels. With such mixed research and results, it is vital that additional study and collection of data be conducted to further the existing knowledge base related to the benefits of single-sex or coeducational classrooms.

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APPENDICES

APPENDIX A:

April 30, 2009

Dr. Jim Scales
Superintendent
Hamilton County Department of Education
4302 Bonny Oaks Drive
Chattanooga, TN. 37416

Dr. Jim Scales,

In addition to serving as assistant principal at Woodmore Elementary School, I am a doctoral student at the University of Tennessee, Chattanooga. As you recall, I met with you in September to explain how I was preparing to conduct a research study on single-sex classes in Hamilton County Schools. At this time, I am requesting your written endorsement of the study.

This study will provide decisive information for Hamilton County leaders of high-poverty schools to determine if grouping students by sex for instruction can positively affect student achievement in the areas of math and literacy.

During the 2007-2008 school year, Hamilton County had 421 fourth and fifth graders who were instructed in single-sex classes in eight Title I public elementary schools. These single-sex class configurations were taught alongside traditional coeducational classroom configurations in the same school building (see attachments). If you have any questions concerning this research study, please call me at 423-400-6938 or contact my dissertation chair, Dr. Valerie Rutledge at 423-316-2300.

I will need your approval to present to the UTC Institutional Review Board (IRB) before clearance is granted to conduct the study. If you have any questions concerning the UTC IRB policies or procedures, please contact Dr. M. D. Roblyer, IRB Committee Chair, at (423) 425-5567 or email instrb@utc.edu.

Thank you in advance for your assistance and cooperation.

Sincerely,

Ashley Aldridge
824 Cherokee Lane
Signal Mountain, TN 37377

I give permission for Hamilton County Schools to release achievement and attendance data of participants involved in this dissertation study. I am aware that all data will be coded to secure the anonymity of participants. Upon its completion, a copy of this dissertation research study will be provided to Hamilton County Schools.

Signature _____
Dr. Jim Scales, Superintendent, Hamilton County Schools

APPENDIX B:

THE UNIVERSITY of TENNESSEE CHATTANOOGA

Institutional Review Board
Dept. 4905
615 McCallie Avenue
Chattanooga, TN 37403-2598
Phone: (423) 425-4443

MEMORANDUM

TO: Ashley Aldridge
Dr. Valerie Rutledge

IRB # 09-099

FROM: Lindsay Pardue, Director of Research Integrity
M. D. Roblyer, IRB Committee Chair

DATE: June 26, 2009

SUBJECT: IRB # 09-099: A Comparison of Students in Single-Sex Classes and Coeducational Classes in High-Poverty Public Schools on Reading and Math Achievement

The Institutional Review Board has reviewed and approved your application and assigned you the IRB number listed above. You must include the following approval statement on research materials seen by participants and used in research reports:

The Institutional Review Board of the University of Tennessee at Chattanooga (FWA00004149) has approved this research project # 09-099.

Please remember that you must complete Form C when the project is completed or provide an annual report if the project takes over one year to complete. The IRB Committee will make every effort to remind you prior to your anniversary date; however, it is your responsibility to ensure that this additional step is satisfied.

Please remember to contact the IRB Committee immediately and submit a new project proposal for review if significant changes occur in your research design or in any instruments used in conducting the study. You should also contact the IRB Committee immediately if you encounter any adverse effects during your project that pose a risk to your subjects.

For any additional information, please consult our web page http://www.utc.edu/irb or email instrb@utc.edu

Best wishes for a successful research project.

APPENDIX C

July 13, 2009

To Whom It May Concern:

The Hamilton County Value Added Model (HCVAS) estimates and compares models for continuous numeric range outcomes using a number of different methods. Using a variety of approaches in a single modeling run, we can select the algorithms to use, and experiment with multiple combinations of options. For example, we predict NCE values using neural net, linear regression, Classification and Regression Tress (C&RT), Support Vector Machines (SVM), General Linear Models, Regression and Chi Square Automatic Intervention Detector (CHAID) models to see which performs best. We try our different stepwise, forward, and backward regression methods to determine "best fits" to the data. The process explores every possible combination of options, ranks each candidate model based on the measure we specify, and saves the best for use in scoring or further analysis. Models with r values between the predicted values and the attained Normal Curve Equivalent (NCE) scores for students below .85 are dropped from the process. The remaining models predicted scores are averaged to predict the most reliable value added score. These are then processed into NCE HCVAS scores for each student.

The process of combining two or more models is used to obtain a more accurate prediction that can be gained from any of the individual models. By combining predictions from multiple models, limitations in individual models may be avoided, resulting in a higher overall accuracy. Models combined in this manner typically perform at least as well as the best of the individual models and often better.

Data used in these models can be described using, as an example, the Regression Model. Here Math 08 NCE scores were predicted using over seventy variables such as academic scale scores from the five Tennessee Comprehensive Assessment Program (TCAP) assessment areas, and various school and student demographics such as its magnet status and attendance records. The attained multiple regression coefficient R in the run observed was over .85, in fact this was.992 giving a Coefficient of Determination of .983. This indicates that models' variable explained the 98.3% of the variation of the observed mathematics scores.

Dr. Kirk Kelly, Director of Accountability and Testing
Office of Accountability and Testing
Hamilton County Department of Education

APPENDIX D

Kelly Dr. Kirk

From: Kelly Dr. Kirk
Sent: Monday, July 06, 2009 5:19 PM
To: 'Lloyd Davis'; ALDRIDGE ASHLEY
Subject: Emailing: Regression%201%20NCE%20Math2008

Warnings

For models with dependent variable NCE_Math08, the following variables are constants or have missing correlations: Elementary. They will be deleted from the analysis.

Variables Entered/Removed(a)

Model	Variables Entered	Variables Removed	Method
1	$N-NCE_Soc06, MagnetStatus, ISSCount, MAXCLASSSZ, DaysEnrolled, age, TardyCount, CLASSLINK, STULINK, TrueAbsences, Mobilitycode, TCHNUM, SUSCount, age_SDBIN, pl_math07, pl_read08, pl_math06, pl_science07, pl_math08, pl_sscst07, pl_read06, pl_science08, pl_science06, pl_read07, pl_sscst08, pl_sscst06, ss_read06, ss_math06, $N-pl_math06, ss_read08, ss_socst07, $N-ss_math08, ss_math07, ss_science06, $N-pl_read08, ss_socst08, ss_read07, ss_math08, ss_science08, ss_socst06, ss_science07, Overaged, $N-pl_math08, Att_PercentADA, $N-pl_sscst06, NCE_Read08, $N-pl_sscst07, NCE_Read06, NCE_Math06, $N-pl_science06, NCE_Read07, $N-pl_read07, NCE_Soc07, NCE_Soc08, $N-pl_read06, NCE_Math07, NCE_Soc06, Absences, NCE_Sci08, NCE_Sci06, $N-pl_sscst08, $N-pl_math07, NCE_Sci07, $N-pl_science08, ADVISOR, $N-pl_science07, $N-ss_socst07, $N-ss_science06, $N-ss_math07, $N-ss_read08, $N-ss_socst06, $N-ss_science07(b)		. Enter

a. Dependent Variable: NCE_Math08

b. Tolerance = .000 limits reached.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.992(a)	.983	.983	2.587607

a. Predictors: (Constant), $N-NCE_Soc06, MagnetStatus, ISSCount, MAXCLASSSZ, DaysEnrolled, age, TardyCount, CLASSLINK, STULINK, TrueAbsences, Mobilitycode, TCHNUM, SUSCount, age_SDBIN, pl_math07, pl_read08, pl_math06, pl_science07, pl_math08, pl_sscst07, pl_read06, pl_science08, pl_science06, pl_read07, pl_sscst08, pl_sscst06, ss_read06, ss_math06, $N-pl_math06, ss_read08, ss_socst07, $N-ss_math08, ss_math07, ss_science06, $N-pl_read08, ss_socst08, ss_read07, ss_math08, ss_science08, ss_socst06, ss_science07, Overaged, $N-pl_math08, Att_PercentADA, $N-pl_sscst06, NCE_Read08, $N-pl_sscst07, NCE_Read06, NCE_Math06, $N-pl_science06, NCE_Read07, $N-pl_read07, NCE_Soc07, NCE_Soc08, $N-pl_read06, NCE_Math07, NCE_Soc06, Absences, NCE_Sci08, NCE_Sci06, $N-pl_sscst08, $N-pl_math07, NCE_Sci07, $N-pl_science08, ADVISOR, $N-pl_science07, $N-ss_socst07, $N-ss_science06, $N-ss_math07, $N-ss_read08, $N-ss_socst06, $N-ss_science07

ANOVA(a)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	914171.952	72	12696.833	1896.263	.000(b)
	Residual	15634.488	2335	6.696		
	Total	929806.439	2407			

a. Dependent Variable: NCE_Math08

1

ANOVA(a)

Model	Sum of Squares	df	Mean Square	F	Sig.

b. Predictors: (Constant), $N-NCE_Soc06, MagnetStatus, ISSCount, MAXCLASSSZ, DaysEnrolled, age, TardyCount, CLASSLINK, STULINK, TrueAbsences, Mobilitycode, TCHNUM, SUSCount, age_SDBIN, pl_math07, pl_read08, pl_math06, pl_science07, pl_math08, pl_sscst07, pl_read06, pl_science08, pl_science06, pl_read07, pl_sscst08, pl_sscst06, ss_read06, ss_math06, $N-pl_math06, ss_read08, ss_socst07, $N-ss_math08, ss_math07, ss_science06, $N-pl_read08, ss_socst08, ss_read07, ss_math08, ss_science08, ss_socst06, ss_science07, Overaged, $N-pl_math08, Att_PercentADA, $N-pl_sscst06, NCE_Read08, $N-pl_sscst07, NCE_Read06, NCE_Math06, $N-pl_science06, NCE_Read07, $N-pl_read07, NCE_Soc07, NCE_Soc08, $N-pl_read06, NCE_Math07, NCE_Soc06, Absences, NCE_Sci08, NCE_Sci06, $N-pl_sscst08, $N-pl_math07, NCE_Sci07, $N-pl_science08, ADVISOR, $N-pl_science07, $N-ss_socst07, $N-ss_science06, $N-ss_math07, $N-ss_read08, $N-ss_socst06, $N-ss_science07

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-196.157	129.972		-1.509	.131
	ADVISOR	-.001	.014	-.002	-.068	.946
	age	-.629	.140	-.016	-4.497	.000
	age_SDBIN	2.901	.429	.051	6.761	.000
	DaysEnrolled	.003	.005	.002	.510	.610
	MagnetStatus	-.141	.180	-.002	-.783	.434
	Mobilitycode	.056	.196	.001	.288	.774
	Overaged	-1.691	.529	-.024	-3.196	.001
	pl_math06	.174	.175	.006	.994	.320
	pl_math07	-.288	.179	-.010	-1.614	.107
	pl_read06	-.111	.191	-.004	-.579	.563
	pl_read07	-.001	.186	.000	-.004	.997
	pl_science06	.195	.186	.007	1.051	.293
	pl_science07	.107	.184	.004	.580	.562
	pl_sscst06	.013	.190	.000	.066	.947
	pl_sscst07	.016	.189	.001	.085	.933
	ss_math06	-.039	.008	-.062	-4.966	.000
	ss_math07	-.059	.009	-.113	-6.488	.000
	ss_read06	.004	.007	.006	.571	.568
	ss_read07	.004	.009	.007	.437	.662
	ss_science06	-.012	.024	-.011	-.503	.615
	ss_science07	.040	.027	.042	1.497	.134
	ss_socst06	-.025	.018	-.024	-1.392	.164
	ss_socst07	.040	.016	.041	2.554	.011
	STULINK	-4.29E-005	.000	-.005	-1.675	.094
	TCHNUM	.002	.014	.005	.149	.881
	CLASSLINK	-4.02E-005	.001	.000	-.072	.942
	MAXCLASSSZ	-.001	.020	.000	-.049	.961

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Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	pl_read08	.109	.191	.003	.569	.569
	pl_math08	2.044	.234	.061	8.746	.000
	pl_science08	.131	.190	.005	.692	.489
	pl_sscst08	.091	.192	.003	.472	.637
	NCE_Read08	.104	.015	.096	7.140	.000
	NCE_Sci08	.017	.023	.017	.736	.462
	NCE_Soc08	.051	.019	.051	2.668	.008
	ss_read08	-.044	.007	-.072	-6.438	.000
	ss_math08	.470	.004	.868	126.617	.000
	ss_science08	.009	.019	.009	.448	.654
	ss_socst08	-.042	.017	-.039	-2.416	.016
	NCE_Read07	-.010	.018	-.010	-.536	.592
	NCE_Math07	.159	.020	.158	8.146	.000
	NCE_Sci07	-.056	.030	-.057	-1.889	.059
	NCE_Soc07	-.046	.019	-.044	-2.371	.018
	NCE_Read06	-.012	.015	-.011	-.802	.422
	NCE_Math06	.069	.016	.066	4.359	.000
	NCE_Sci06	-.005	.024	-.005	-.221	.825
	NCE_Soc06	.011	.020	.011	.546	.585
	Absences	-.029	.036	-.017	-.793	.428
	TrueAbsences	.026	.043	.009	.609	.543
	ISSCount	.034	.096	.001	.350	.726
	SUSCount	.010	.028	.001	.353	.724
	TardyCount	.052	.038	.019	1.384	.167
	Att_PercentADA	.010	.035	.003	.287	.774
	$N-pl_math06	.467	.928	.014	.504	.615
	$N-pl_math07	-.047	1.181	-.002	-.040	.968
	$N-pl_read06	-.380	.838	-.011	-.453	.650
	$N-pl_read07	.291	.896	.009	.325	.745
	$N-pl_science06	.990	.827	.033	1.198	.231
	$N-pl_science07	.029	1.022	.001	.029	.977
	$N-pl_sscst06	-.324	.924	-.011	-.351	.725
	$N-pl_sscst07	-.184	1.160	-.007	-.159	.874
	$N-ss_math07	.097	.213	.075	.454	.650
	$N-ss_science06	-.085	.543	-.022	-.156	.876
	$N-ss_science07	-.277	.506	-.144	-.549	.583
	$N-ss_socst06	.350	.663	.118	.528	.598
	$N-ss_socst07	.010	.418	.005	.024	.981
	$N-pl_read08	-.088	.739	-.003	-.119	.905

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Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	$N-pl_math08	-.593	1.921	-.015	-.308	.758
	$N-pl_science08	-.584	1.139	-.022	-.513	.608
	$N-pl_sscst08	.145	.942	.005	.154	.877
	$N-ss_read08	-.019	.151	-.027	-.128	.898
	$N-ss_math08	.045	.110	.068	.408	.683
	$N-NCE_Soc06	-.133	.770	-.046	-.173	.863

a. Dependent Variable: NCE_Math08

Tracking:

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APPENDIX E:

VITA

Name: Ashley Elizabeth Aldridge

EDUCATION:

2009	University of Tennessee, Chattanooga, Tennessee Doctorate of Education, Learning & Leadership
2006	Tennessee Technological University, Cookeville, Tennessee Specialist in Education, Instructional Leadership
2004	Public Education Foundation, Chattanooga, Tennessee Leadership Fellow
2002	Tennessee Technological University, Cookeville, Tennessee Master of Arts, Instructional Leadership and Supervision
1998	Fuller Theological Seminary, Pasadena, California Personal Growth and Study: International Development
1996	University of Tennessee, Chattanooga, Tennessee Bachelor of Science, Human Ecology: Early Childhood Education

RELATED EXPERIENCE:

2009-Present	Hardy Elementary School, Assistant Principal Hamilton County Schools, Chattanooga, Tennessee
2007-2009	Woodmore Elementary School, Assistant Principal Hamilton County Schools, Chattanooga, Tennessee
2006-2007	Barger Academy of Fine Arts, Assistant Principal Hamilton County Schools, Chattanooga, Tennessee
2000-2006	Thrasher Elementary School, Teacher Hamilton County Schools, Chattanooga, Tennessee
1999-2000	The Christ School, Teacher Christian Schools of Central Florida, Orlando, Florida
1996-1998	Mary Ann Garber Elementary, Teacher Chattanooga City Schools, Chattanooga, Tennessee

PROFESSIONAL AFFILIATION:

Alpha Delta Gamma, International

Association for Curriculum and Development

Hamilton County Education Association

National Teachers Association

Public Education Foundation, Leadership and Benwood Initiatives

Tennessee Principals Association